KENWOOD

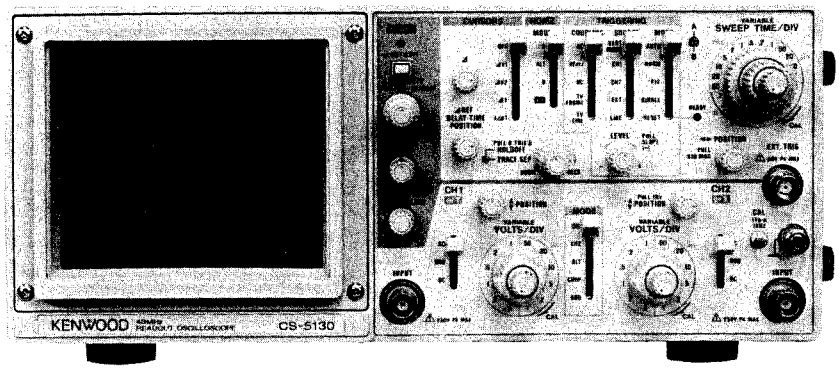
40MHz OSCILLOSCOPE

# CS-5130

## SERVICE MANUAL

**S/No. 2110001~**

KENWOOD CORPORATION



## WARNING

The following instructions are for use by qualified personnel only. To avoid electric shock, do not perform any servicing other than contained in the operating instructions unless you are qualified to do so.

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# SPECIFICATIONS

| | | CS-5130 |
|---|---|---|
| **CRT** | | 150 mm rectangular with internal graticule |
| Acceleration Voltage | | 12 kV |
| Display Area | | 8×10 div (1 div = 10 mm) |
| **VERTICAL AXIS** (CH1 and CH2) | | |
| Sensitivity | | 1 mV/div to 5 V/div: 1 mV to 2 mV/div ±5%, 5 mV/div to 5 V/div ±3% |
| Attenuator | | 12 steps, 1 mV/div to 5 V/div in 1-2-5 sequence<br>Vernier control for fully adjustable sensitivity between steps |
| Input Impedance | | 1 MΩ ±2%, approx. 30 pF |
| Frequency Response | DC | DC to 40 MHz, within −3 dB (5 mV/div to 5 V/div)<br>DC to 15 MHz, within −3 dB (1 mV/div to 2 mV/div) |
| | AC | 5 Hz to 40 MHz, within −3 dB (5 mV/div to 5 V/div)<br>5 Hz to 15 MHz, within −3 dB (1 mV/div to 2 mV/div) |
| Rise Time | | 8.7 ns (5 mV/div to 5 V/div)<br>17.5 ns (1 mV/div & 2 mV/div) |
| Signal Delay Time | | Adequate to identify leading edge |
| Crosstalk | | −40 dB or less (at 1 kHz) |
| Operating Modes | CH1 | Single trace |
| | CH2 | Single trace |
| | ALT | Two-waveform display, alternately |
| | CHOP | Two-waveform display, chopped |
| | ADD | CH1 + (±CH2) added display |
| Chop Frequency | | Approx. 300 kHz |
| Channel Polarity | | Normal or inverted, channel 2 only inverted |
| ⚠ Maximum Input Voltage | | 500 Vp-p or 250 V (DC + AC peak) |
| **HORIZONTAL AXIS** Input thru CH2, ×10 MAG not included | | |
| Operating Modes | | X-Y operation is selectable with HORIZ MODE switch<br>CH1 : Y axis<br>CH2 : X axis |
| Sensitivity | | Same as vertical axis (CH2) |
| Input Impedance | | Same as vertical axis (CH2) |
| Frequency Response | DC | DC to 1 MHz, within −3 dB |
| | AC | 5 Hz to 1 MHz, within −3 dB |
| X-Y Phase Difference | | 3° or less at 100 kHz |
| ⚠ Maximum Input Voltage | | Same as vertical axis (CH2) |
| **SWEEP** | | |
| Type | A | A sweep |
| | ALT | A sweep (intensified for duration of B sweep) and B sweep (delayed sweep) alternating |
| | B | Delayed sweep |
| | X-Y | X-Y oscilloscope operation |
| Sweep Time | A | 0.2 μs/div to 0.5 s/div ±3%, in 20 ranges, in 1-2-5 sequence<br>Vernier control for fully adjustable sweep time between steps |
| | B | 0.2 μs/div to 50 ms/div ±3%, in 17 ranges, in 1-2-5 sequence |
| Sweep Magnification | | ×10 (ten times) ±5% (±8% in 0.2 μs-to-0.5 μs range) |
| Linearity | | ±3% (±5% for ×10 magnification) |
| Holdoff | | Continuously variable from NORM to more than ten time (MAX) |

# SPECIFICATIONS

| | | CS-5130 |
|---|---|---|
| Trace Separation | | Shifts B sweep trace continuously in vertical direction by 4 divisions or more with respect to A sweep |
| Delayed Sweep | | Continuous delay (AFTER DELAY) & triggered delay (B TRIG' D: triggered by A trigger) |
| Delay Time | | Continuous adjustable from 0.2 μs/div to 0.5 s/div |
| Delay Accuracy | | ±(3% of set value + 1% of full scale) + (0 to 300 ns) |
| Delayed Jitter | | 10000 : 1 of decupled time axis A set value |
| **TRIGGERING** | | |
| Modes | | AUTO, NORM, FIX, & SINGLE-RESET |
| Trigger Source | VERT MODE | Triggered by input signal selected with vertical MODE selector |
| | CH1 | Triggered by CH1 vertical signal |
| | CH2 | Triggered by CH2 vertical signal |
| | LINE | Triggered by line frequency |
| | EXT | Triggered by external trigger signal |
| External Trigger Input Impedance | | 1 MΩ ± 2%, approx. 25 pF |
| ⚠ MAX. EXT. Input Voltage | | 50 V (DC + AC peak) |
| Coupling | | AC, HFREJ, DC, TV-FRAME, & TV-LINE |
| Trigger Sensitivity | At NORM position | |
| | AC | Trigger frequency range<br>10 Hz to 20 MHz (INT: 1 div, EXT: 0.15 Vp-p)<br>10 Hz to 40 MHz (INT: 1.5 div, EXT: 0.2 Vp-p) |
| | DC | Trigger frequency range<br>DC to 20 MHz (INT: 1 div, EXT: 0.15 Vp-p)<br>DC to 40 MHz (INT: 1.5 div, EXT: 0.2 Vp-p) |
| | HFREJ | Trigger frequency range is more than 50 kHz, and minimum amplitude (voltage) required for sync is increased. |
| | TV | FRAME, LINE<br>INT: 1.0 div, EXT: 0.15 Vp-p |
| | AUTO: Same as above specifications for above 50 Hz | FIX: 50 Hz to 20 MHz (INT: 1.5 div, EXT: 200 mV)<br>50 Hz to 40 MHz (INT: 2.0 div, EXT: 250 mV) |
| **CALIBRATION VOLTAGE** | | 1 V p-p ± 3%, square wave, positive polarity, approx. 1 kHz |
| **INTENSITY MODULATION** | | |
| Sensitivity | | + 5 V, positive voltage decreases brightness |
| Input Impedance | | Approx. 10 kΩ |
| Usable Frequency Range | | DC to 5 MHz |
| ⚠ Maximum Input Voltage | | 50 V (DC + AC peak) |
| **VERTICAL AXIS SIGNAL OUTPUT** (CH1 only) | | |
| Output voltage | | Approx. 50 mVp-p/div (50 Ω termination) |
| Output Impedance | | Approx. 50 Ω |
| Frequency Response | | 100 Hz to 40 MHz, −3 dB/50 Ω termination<br>(1 mV/div, 2 mV/div: 100 Hz to 15 MHz, −3 dB) |

# SPECIFICATIONS

| | | CS-5130 |
|---|---|---|
| **READOUT** | | |
| Set Value | | CH1/CH2 scale factor (with probe detection); V-UNCAL, ADD, INVERT<br>A/B sweep scale factor (magnification conversion): SWEEP-UNCAL, AFTER DELAY, TRIG' D, X-Y |
| Cursor Mode<br>A mode only | ΔV1 | Voltage difference between ΔREF and Δcursors on a CH1 scale factor basis |
| | ΔV2 | Voltage difference between ΔREF and Δcursors on a CH2 scale factor basis |
| | ΔT | Time difference between ΔREF and Δcursors on the basis of A sweep scale factor |
| | 1/ΔT | Frequency between ΔREF and Δcursors on the basis of A sweep scale factor |
| | | Ratio: Voltage and time ratio between ΔREF and Δcursors, supposing 5-division on the CRT as 100% |
| | | Phase: Phase difference between ΔREF and Δcursors, supposing 5-division on the CRT as 360° |
| NOTE: The X-Y mode allows ΔV1 measurement only. | | |
| Cursor Measurement | Resolution | 10 bits |
| | Measurement accuracy | ±4 % |
| | Measurable range | ΔV, Ratio: ±3.6 div or more from the CRT center<br>ΔT, 1/ΔT, Ratio, Phase: ±4.6 div or more from the CRT center |
| **TRACE ROTATION** (Electrical, adjustable from front panel) | | |
| **POWER REQUIREMENT** | | |
| Line Voltage | | AC 100 V/120 V/220 V/240 V±10% |
| Line Frequency | | 50/60 Hz |
| Power Consumption | | Approx. 47 W |
| **DIMENSIONS** (W×H×D) | | 319 (341)×132 (145)×380 (455) mm<br>( ) dimensions include protrusion from basic outline dimensions |
| **WEIGHT** | | 9.0 kg |
| **ENVIRONMENTAL** | | |
| Within Specifications | | 10°C to 35°C, 85% max. relative humidity |
| Full Operation | | 0°C to 40°C, 85% max. relative humidity |
| **ACCESSORIES SUPPLIED** | | |
| Probe | | PC-33 (READOUT compatible probe)×2 |
| | Attenuation | 1/10 |
| | Input impedance | 10 MΩ, 25 pF ±10% |
| Power supply cable | | 1 |
| Replacement Fuse | | 1 A×2, 0.5 A×2 |
| Instruction Manual | | 1 |

* Circuit and rating are subject to change without notice due to developments in technology.

# SAFETY

## SAFETY

Before connecting the instrument to a power source, carefully read the following information, then verify that the proper power cord is used and the proper line fuse is installed for power source. The specified voltage is shown on the rear panel. If the power cord is not applied for specified voltage, there is always a certain amount of danger from electric shock.

**Line voltage**

This instrument operates using AC power input voltages that 100/120/220/240 V at frequencies from 50 Hz to 60 Hz.

**Power cord**

The ground wire of the 3-wire AC power plug places the chassis and housing of the oscilloscope at earth ground. Do not attempt to defeat the ground wire connection or float the oscilloscope; to do so may pose a great safety hazard. The appropriate power cord is supplied by an option that is specified when the instrument is ordered.
The optional power cords are shown as follows in Fig. 1.

**Line fuse**

The fuse holder is located on the rear panel and contains the line fuse. Verify that the proper fuse is installed by replacing the line fuse.

**Voltage conversion**

This oscilloscope may be operated from a 100 V to 240 V, 50/60 Hz power source. Use the following procedure to change from 100 to 240 volt operation or vice versa.

1. Replace fuse F 1 with a fuse of appropriate value, 1 amp for 100 VAC to 120 VAC operation, 0.5 amp for 220 VAC to 240 VAC operation.
2. When performing the reinsertion of leadwire for the voltage conversion, the appropriate power cord should be used. (See Fig. 1.)

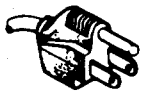
| Plug configuration | Power cord and plug type | Factory installed instrument fuse | Line cord plug fuse | Parts No. for power cord set |
|---|---|---|---|---|
|  | North American<br>120 volt/60 Hz<br>Rated 15 amp<br>(12 amp max; NEC) | 1 A, 250 V<br>Fast blow<br>6×30 mm | None | Cord:<br>E30-1820-05 |
| | Universal Europe<br>220 volt/50 Hz<br>Rated 16 amp | North Europe<br>500 mA, 250 V<br>Slow blow 5×20 mm<br>Other Europe<br>0.5 A, 250 V<br>Fast blow 6×30 mm | None | Cord:<br>E30-1819-05 |
| | U.K.<br>240 volt/50 Hz<br>Rated 13 amp | 0.5 A, 250 V<br>Fast blow<br>6×30 mm | 0.8 A<br>Type C | — |
| | Australian<br>240 volt/50 Hz<br>Rated 10 amp | 0.5 A, 250 V<br>Fast blow<br>6×30 mm | None | Cord:<br>E30-1821-05 |
| | North American<br>240 volt/60 Hz<br>Rated 15 amp<br>(12 amp max; NEC) | 0.5 A, 250 V<br>Fast blow<br>6×30 mm | None | — |
| | Switzerland<br>240 volt/50 Hz<br>Rated 10 amp | 0.5 A, 250 V<br>Fast blow<br>6×30 mm | None | — |

**Fig. 1 Power Input Voltage Configuration**

# CIRCUIT DESCRIPTION

## Vertical Preamp Circuit (X73-1790-01)

The signal from the input terminals of CH1 OR Y and CH2 OR X is attenuated to the appropriate value by ATT and sent to head amplifiers Q3 to Q5 (CH2: Q103 to Q105). The signal is then sent to the cascade U2 (CH2: U102) through the GAIN switch (connected to the ATT).
The feedback of the direct current component is applied by the operation amplifier U1 (CH2: U101) to reduce the drift in the head amplifier.
The cascade amplifier U2 (CH2: U102) is a gain switch type of amplifier. The amplification degree (at X5 MAG) reaches five times the normal level (5 mV/div to 5V/div range) within the range of 1 mV/div, 2 mV/div. The output signal from the cascade AMP U1 (CH2: U101) is input to the second cascade amplifier Q6 to Q9 (CH2: Q106 to Q111).
The CH1 and CH2 signals are selected by the V-MODE switch and applied to the delay line driver Q201 and Q202. The Q110 and Q111 of CH2 are used for inversion.

## Trigger Signal Switch Circuit (X73-1790-01)

The signal output by the emitter of the CH1 and CH2 second cascade amplifier is used as the trigger signal for CH1 OUT/CH1 TRIG pickoff amplifiers Q11 and Q12 and CH2 TRIG pickoff amplifiers Q112 and Q113. The signal amplified by each pickoff amplifier for CH1 and CH2 is selected by the switch signal from the horizontal unit through P7 and applied to the trigger preamplifier of the horizontal unit through P4.
The signal that is picked up from the Q12 collector of the CH1 trigger pickoff amplifier is output from P1 through emitter follower Q13.

## Vertical Final Amplifier (X73-1790-01)

The signal from the delay line is amplified in the terminal by cascade amplifiers Q205 to Q207. The signal converted to the low impedance by the Q209 and Q210 emitter follower is amplified to an adequate level to drive the CRT tydeflection by final stage amplifiers Q211 to Q220.

## Power Supply Circuit (X73-1790-01)

The power supply consists of four stabilization and two destabilization systems. The standard power supply is +12V and has a voltage adjustment circuit. The −12V power supply uses a +12V reference voltage for stabilization. The +5V and +145V power supply uses a −12V reference voltage for stabilization. The scale illumination circuit power supply is ±18V. The voltage rectified by D301 is applied to the horizontal unit scale illumination circuit through P12.
The +18V is supplied to the primary side of the horizontal unit high-voltage oscillation circuit through P10.

## CAL Circuit (X73-1790-01)

The oscillation circuit is produces a 1 kHz square wave by the C-MOS IC U351a and U351b multivibrator. The waveform is produced by the U351c and U351d and outputs the 1Vp-p CAL signal from P13 by the low-resistance separation.

## Trigger Circuit (X74-1490-01)

The trigger signal from the vertical section is sent to the source coupling switch through signal comparators Q1 and Q2 and added to the Q4 and Q5 level comparator by the low impedance signal of the differential amplifier at FET Q3. This signal is formed by the Schmidt trigger circuit that terminates the slope switch, activates the A and B sweep gate and automatic free run circuits in the oscillation circuit.
Q6 and Q7 are the signal differential detection circuits for the FIX synchronization amplified at Q8 and Q9. The mid-range voltage at this point is applied to the Schmidt simulation circuit. Q10, Q12 and the U1c are the synchronization signal separation circuit for the television synchronization.
The X-signal for the X-Y operation is obtained from the CH2 trigger pickoff and applied to the horizontal amplifier Q301 at the Q16 to Q18 output circuit.

## Horizontal Sweep Circuit (X74-1490-01)

If the trigger pulse is applied to the U102a flip-flop, the output is switched and the Miller integrator, consisting of Q104 to Q108 and U103, starts the sweep. The sweep length of this sweep signal is determined at Q113 and the flip-flop U102b. After the stand-by time is determined by the Q110, Q111, and U112 hold-off circuits, the units waits for the trigger signal.
After the delay time is determined by the voltage from the delay pickoff comparator Q211 to Q215 and the delay time position, the flip-flop U201a output is switched and the Miller integrator consisting of Q204 to Q208 and U202 starts the B-sweep.
The A- and B-sweep signals are switched by the horizontal switching circuit that includes the H-MODE switch, U203, U104 and applied to the horizontal amplifier Q301.

## Horizontal Amplifier Circuit (X74-1490-01)

The sweep signal of the sweep circuit is applied to the drive amplifier Q301 to Q304. The X1 or X10 gain setting is selected at this time. The current amplification signal is converted to the voltage signal at Q305 and Q306, and then amplified enough to drive the CRT deflection by the high amplification ratio and low-output impedance of the final amplifier Q307 to Q312.

## Z-axis Amplifier and High-voltage Circuit (X74-1490-01)

The unblanking signal from the blanking control circuit is inversion amplified by the blanking amplifier Q401, Q403, Q405 and Q407. It layers the cathode voltage at the direct current reproduction circuit at D405 and D406 and drives the first grid cathode of the CRT.
Q404, Q406 and Q408 produce the focus voltage from the blanking signal by the phase inversion amplifier for the linear focus.
The focus voltage is layered in the high-voltage in the direct current reproduction circuit D410 and D411 and drives the positive pole of the CRT terminal. The −1700V used for the cathode pole drive is produced by the control circuit U401 and the DC-DC converter at the blocking oscillator Q409. The third positive cathode voltage is produced by rectifying the DC-DC converter second side coil voltage six times.

# CIRCUIT DESCRIPTION

## Trace Rotation Circuit and Scale Illumination Circuit (X74-1490-01)

The trace rotation circuit drives the rotation coil located in the CRT cone by the current from the common emitter of the complimentary transistors Q410 and Q411. The scale illumination circuit performs the light adjustment by Q412 and Q413.

## Readout X-character Signal Switching Circuit (X74-1490-01)

The X-signal and the request signal from the readout unit (X77-1510-00) are applied to the switching amplifier Q501 and Q502 through the comparator Q503 and Q504 from P36.
The gain and center of the X-character signal are determined, supplied to the base of Q305 and Q306 of the horizontal axis amplifier which drives the horizontal axis final amplifier while the sweep is stopped.

## Readout Z-axis Signal Switching Circuit (X74-1490-01)

The blanking signal from the readout unit (X77-1510-00) is applied to the C-MOS IC U501 through P37. The pulse width output signal of the R521 and C503 timing is applied to the Z-axis input.
The unblanking signal is applied to the Z-axis input through Q505 and Q506 from P37. This signal is also applied to the readout unit as a readout-off signal through the operation amplifier U502 from P37.

## Readout Y-Character Signal Switching Circuit (X73-1790-01)

The Y-signal and the request signal from the readout unit (X77-1510-00) is applied to the switching amplifier Q401 and Q402 through the comparator Q403 and Q404 from P36. The gain and center of the Y-character signal is determined, supplied to the Q207 and Q208 emitters of the vertical axis final amplifier and drives the vertical axis final amplifier while the sweep is stopped.

## R/O UNIT (X77-1510-00)

The readout unit functions include the three features described below.

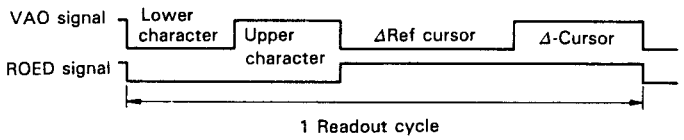
1) Import unit
   This unit imports the data for each switch for the CRT readout display. (This consists of U17-U24 in the IC).
2) Display unit
   This forms the X-axis and Y-axis for the CRT readout display. (This includes the U1-U5, U7, U8, U13, and R33 of each IC and the voltage).
3) Cursor unit
   This includes of A/D converter and caclulator for the cursor measurement.
   (This includes U6, U8-U11, U14, U23 of the IC.)

**Import unit**

This unit imports data for each switch operation. A one-chip MPU U23 transfers the data to the character generator (U7). A reference clock is provided from a 10-MHz oscillator that uses U16 and X1.
The A0 - A7 low order addresses are output to the data bus by time assignment. U18 latches the low order addresses by the ALE signal output from the MPU.
The switch data necessary for the monitor display is imported to the MPU every 80 ms through the I/O port of U19 - U22. U17 is output by the I/O port decoder and the output signal RS0-RS3 is output in 80 ms cycles.

**Display unit**

The character display is controls the character generator U7 by the character counter (U8 DC1-CD7) and the dot counter (U8 DC0-DC4) using the random scan method (X-Y display).
The readout display is performed in 13.5 ms for each cycle. One cycle of the readout display is separated into four parts, low characters, high characters, the ΔREF cursor and the Δ-Cursor. The timing is then switched by pins U8-89 of the ROED signal and pins U8-U16 of the VA0 signal.




5 × 7 dot configuration character data is input to the character generator U7.
The three bits DD0 - DD2 are X-axis data and the four bits DD3 - DD6 are Y-axis data. DD7 is the character start and end control bit.
The digital signal output from U7 is converted to each analog signal by the data converter U1 for the X-axis signal, V33 and R33 and the D/A converter for the Y-axis signal configured by U3 and R33. The X-axis and Y-axis signals are sent through analog switch U4 and U5 and U13 of the buffer amplifier to the Vertical unit (X73-1790-01).
The character dot display is controlled by the ROUB signal (U8-86 pin), ROB signal (U8-87 pin) and the ROQ signal (U8-88 pin).
The real waveform display is cleared by the ROB signal, the real waveform and the readout switch are performed by the ROQ signal and the readout dot display is performed by the ROUB signal.
The three signals described above are controlled by the ROSP signal in pin 83 of U8 (readout off signal $\overline{\text{R/O OFF}}$).

# CIRCUIT DESCRIPTION

**Cursor Unit**

The ± 1.25 V cursor reference voltage is formed by the low-resistance separation of the + 10 V power supply voltage and output through U11, U15, Q1 and Q2. This ± 1.25 V corresponds to the full scale voltage of the 10-bit separation function of the cursor measurement.

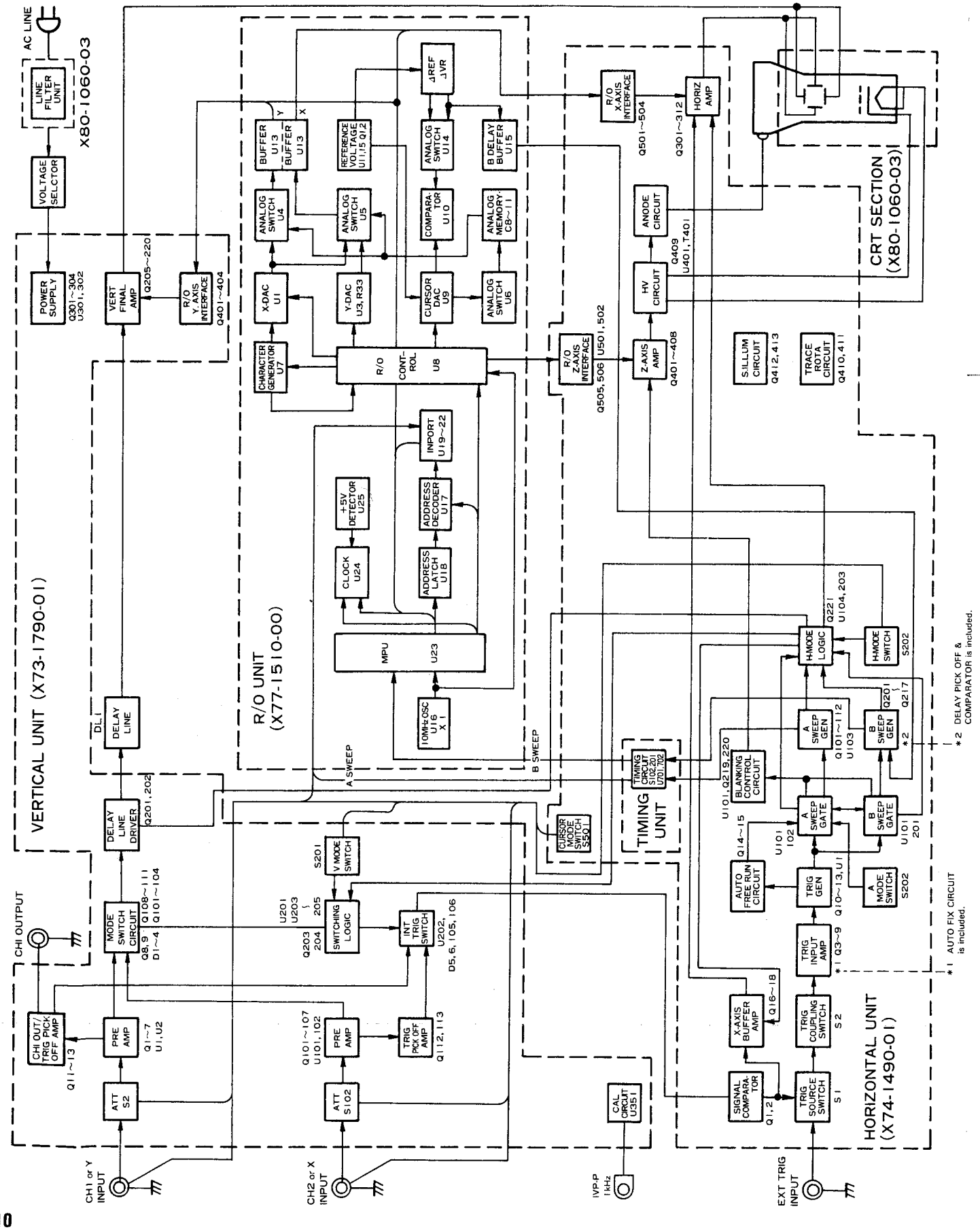
The voltage set by the cursor VR is sent directly to the analog switch U14 for the X-axis measurement and reduced 80% for the Y-axis measurement. U14 performs the ΔT and ΔV switching and the ΔREF and Δ-Cursor switching.

The MPU U23 sends the 10-bit data to the D/A converter U9 where the data is converted to analog voltage. The converter U10 compares the voltage from analog voltage and the cursor VR and returns the output to MPU U23.

U8, U9, U10 and U23 obtained by this process configure the A/D converter. This A/D converter converts the analog voltage from the ΔREF and Δ-Cursor VR to 10-bit digital data. The conversion speed for the A/D converter is 80 ms.

Next, the MPU performs the cursor calculations using this converted 10-bit digital data. The analog voltage output from the D/A converter U9 is converted to the ΔREF and Δ-Cursor by analog switch U6 and is maintained in each hold circuit every 80 ms for the hold voltage.

# BLOCK DIAGRAM



# ADJUSTMENT

To obtain the best performance, periodically calibrate the unit. Sometimes, only one mode need be calibrated, while at other times, all modes should be calibrated. When one mode is calibrated, it must be noted that the other modes may be affected. When calibrating all modes, perform the calibration in the specified sequence.
The following calibration required an accurate measuring instrument and an insulated adjusting flat blade screwdriver. If they are not available, contact your dealer. For optimum adjustment, turn the power on and warm up the scope sufficiently (more than 30 minutes) before starting.
Before calibrating the scope, check the power supply voltage.

## TEST EQUIPMENT REQUIRED

The following instrument or their equivalent should be used for making adjustment.

| Test Equipment | Model | Minimum Specification |
|---|---|---|
| Digital Multi-Meter | DL-706 (KENWOOD) | Impedance: More than 10 MΩ, Measuring range: 0.01 V to 199 V |
| Sine-Wave Generator | 651 B (YHP) | Frequency: 10 Hz to 10 MHz, constant voltage over tuning range |
| Sine-Wave Generator | SG-503 (Tektronix) | Frequency: 50 kHz to 100 MHz, Output impedance: 50 Ω, constant voltage over tuning range |
| Square-Wave Generator | PG-506 (Tektronix) | Output signal: 1 kHz, Amplitude: 10 mVp-p to 10 Vp-p, Accuracy: within ±1%, Rise time: 35ns or less<br>100 kHz, Rise time: 1 ns or less |
| Q Meter | 4343B (YHP) | — |
| Color Pattern Generator | CG-911A (KENWOOD) | — |
| Oscilloscope | CS-2110 (KENWOOD) | Sensitivity: more than 5 mV<br>Frequency response: More than 100 MHz |
| Time-Marker Generator | TG-501 (Tektronix) | Time mark: 0.5 s to 0.1 μs repetive waveform |
| High-Voltage Probe | — | Input Impedance: 1000 MΩ |
| Termination | — | Impedance: 50 Ω<br>Accuracy: within 3% |
| Termination | — | 3 watts type impedance: 50 Ω |
| Attenuator | — | −20 dB attenuation (50 Ω) |

**Table 1**

## PREPARATION FOR ADJUSTMENT

### Control Settings

The control settings listed below must be used for each adjustment procedure.
Exceptions to these settings will be noted as they occur. After completing a adjustment, return the controls to the following settings.

| NAME OF KNOBS | POSITION |
|---|---|
| INTEN | 12 o'clock |
| FOCUS, ASTIG | Optimum position |
| CH1, CH2 ▲▼ POSITION | Mechanical center |
| CH1, CH2 STORAGE POSI | Mechanical center |
| ◄► POSITION/PULL ×10MAG | Mechanical center, push |
| VARIABLE, H.VARIABLE (VOLTS/DIV, SWEEP TIME/DIV) | CAL |
| AC-GND-DC (CH1 and CH2) | DC (GND at no signal) |
| Vertical MODE | CH1 |
| CH2 PULL INV | Push (NORM) |
| TRIGGERING COUPLING | AC |
| TRIGGERING SOURCE | CH1 |
| TRIGGERING LEVEL | Mechanical center, push |
| TRIGGERING MODE | AUTO |
| VOLTS/DIV (CH1 and CH2) | 5 mV/DIV |
| A, B SWEEP TIME/DIV | 1 ms/DIV |
| TRACE SEP | Fully CCW |
| HOLDOFF | Fully CCW, NORM, Push |
| HORIZONTAL MODE | A |
| DELAY TIME POSITION | Optimum position |

**Table 2**

# ADJUSTMENT

## 1. POWER SUPPLY AND CRT SECTION ADJUSTMENTS

| Item | Adjustment VR (TC) | P.C.B. | Procedure |
|---|---|---|---|
| +12 V | VR301 | X73-1790 | Adjust VR301 so that the voltage at pin 5 of the connector P14 is +12 V. |
| CRT Center | VR202 | X73-1790 | By CH2 post, locate a point at which luminance line does not move on the PULL and PUSH setting of CH2 INV.<br>Keep CH2 post as it is, and adjust VR202 to center on the screen. |
| Vertical Center Voltage | VR204 | X73-1790 | With short-circuiting held as it is, adjust VR204 so that the voltage between CRT socket pin "9" and GND is 75 V.<br>* CRT socket pin "9" refers to titanium oxide porcelain capacitor C5.<br>After adjustment, undo the short-circuiting. |
| Focus Center | VR402 | X74-1490 | Push the FOCUS knob in (for the FOCUS operation) and then set it to the mechanical center position.<br>Pull the knob out (for the ASTIG operation), display a spot on the screen, and adjust the ASTIG control and VR402 to minimize the dimension of the spot. |
| B Intensity | VR403 | X74-1490 | SWEEP A : 0.1 ns/div.<br>SWEEP B : 1 μs/div.<br>HORIZONTAL MODE ALT<br>Set VR404 nearly at the center.<br>(At that time, check that the difference in luminance between SWEEP A and SWEEP B is explicitly known.) |
| Intensity | VR401 | X74-1490 | Display the spot on the CRT screen, and adjust VR401 so that the spot disappears when the INTEN knob is set to the 10-o'clock position. |

## 2. VERTICAL SECTION ADJUSTMENTS

| Item | Adjustment VR (TC) | P.C.B. | Procedure |
|---|---|---|---|
| CH1 Waveform Shaping | TC2<br>TC4 | X73-1790 | AC-GND-DC : DC<br>Apply 10 kHz square wave to CH1 INPUT (with the amplitude extending over 4 to 6 div).<br>Set CH1 VOLTS/DIV to 0.1 V range (and 1 V range), and adjust TC2 (and TC4) so that the waveform becomes flat in both ranges. |
| CH2 Waveform Shaping | TC102<br>TC104 | X73-1790 | Adjust in the same way as for CH1. |
| CH1 Input Capacity | TC1<br>TC3 | X73-1790 | AC-GND-DC : DC<br>CH1 VOLTS/DIV : 5 mV<br>Connect the capacity meter to the CH1 INPUT, and measure the input capacity in the 5 mV range.<br>Adjust TC1 and TC3, alternately, so that the input capacity in the 0.1 V and the 1 V ranges equals the same capacity as in the 5 mV range. |
| CH2 Input Capacity | TC101<br>TC103 | X73-1790 | Adjust in the same way as for CH1. |
| CH1 Step ATT Balance | VR1<br>VR3 | X73-1790 | Adjust VR3 so that the position of the luminescent line does not change even when the vertical attenuator is selected between 1 and 2 mV range.<br>Switch the range between 2 and 5 mV ranges, and perform the same adjustment using VR1. |
| CH1 Variable Balance | VR6 | X73-1790 | VOLTS/DIV : 10 mV<br>Adjust VR6 so that the position of the luminescent line does not change even if the VARIABLE knob is rotated.<br>Vary the settings of the VOLTS/DIV and VARIABLE controls and see if the trace position also moves; if it does, adjust VR1, 3 and 6 again. |

# ADJUSTMENT

| Item | Adjustment VR (TC) | P.C.B. | Procedure |
|---|---|---|---|
| CH2 Step ATT Balance | VR101<br>VR103 | X73-1790 | Adjust in the same way as for CH1. |
| CH2 Variable Balance | VR106 | X73-1790 | Adjust in the same way as for CH1. |
| CH1 Position Center | VR7 | X73-1790 | CH1 POSITION : Mechanical center position<br>CH1 VOLTS/DIV : 5 mV<br>Adjust VR7 so that the trace is located on the center of the screen. |
| CH2 Position Center | VR107 | X73-1790 | Adjust in the same way as for CH1. |
| ADD position | VR201 | X73-1790 | Set the channel 1 and channel 2 position controls so that the trace is located on the center of the screen and select the vertical MODE switch to ADD position.<br>Adjust VR201 to center the trace vertically. |
| CH1 Gain | VR9 | X73-1790 | CH1 VOLTS/DIV : 5 mV<br>Input a square wave signal having an amplitude of 20 mV, and adjust VR9 so that the CRT amplitude becomes 4 div. |
| CH1 1 mV Range Gain | VR4 | X73-1790 | CH1 VOLTS/DIV : 1 mV<br>Input a square wave signal having an amplitude of 5 mV, and adjust VR4 so that the CRT amplitude becomes 5 div. |
| CH2 Gain | VR109 | X73-1790 | Adjust in the same way as for CH1. |
| CH2 1 mV Range Gain | VR104 | X73-1790 | Adjust in the same way as for CH1. |
| X Gain | VR2 | X74-1490 | CH2 VOLTS/DIV : 5 mV<br>HORIZONTAL MODE: X-Y<br>Input the square wave signal having an amplitude of 20 mV into CH2 INPUT, and adjust VR2 so that the CRT amplitude in the horizontal direction becomes 4 div. |

# ADJUSTMENT

### 3. TRIGGER SECTION ADJUSTMENTS

| Item | Adjustment VR (TC) | P.C.B. | Procedure |
|---|---|---|---|
| Trigger Level Center | VR1 | X74-1490 | TRIGGERING MODE : AUTO<br>SOURCE : CH1<br>COUPLING : AC<br>LEVEL : Mechanical center position<br>CH1 VOLTS/DIV : 5 mV<br>Input a 1 kHz sine wave into CH1 INPUT, and adjust the oscillator so that the CRT amplitude becomes 6 div.<br>Adjust VR1 so that start point of the luminescent line is at the center of the CRT (vertical direction). |
| CH1 Trigger DC Coupling | VR11 | X73-1790 | After adjusting the trigger level center, set the TRIGGERING COUPLING to the DC position.<br>Adjust VR11 so that the start point of the luminescent line is at the same position as in the AC mode. |
| CH2 Trigger DC Coupling | VR111 | X73-1790 | TRIGGERING MODE : AUTO<br>SOURCE : CH2<br>COUPLING : AC<br>CH2 VOLTS/DIV : 5 mV<br>Input a 1 kHz sine wave to CH2 INPUT, and adjust the oscillator so that the CRT amplitude becomes 6 div.<br>Adjust the TRIGGERING LEVEL so that the start point of the luminescent line is at the center of the CRT.<br>Set the TRIGGERING COUPLING to the DC position.<br>Adjust VR111 so that the start point of the luminescent line is at the same position as in the AC mode. |

### 4. HORIZONTAL SECTION ADJUSTMENTS

| Item | Adjustment VR (TC) | P.C.B. | Procedure |
|---|---|---|---|
| B Sweep Start Point | VR202 | X74-1490 | HORIZONTAL MODE : ALT<br>A and B SWEEP TIME/DIV: 1 ms<br>Adjust VR202 to coinside the start point of B sweep with that of A sweep. |
| 1 ms Range Sweep Time | VR101<br>VR201 | X74-1490 | SWEEP TIME/DIV : 1 ms<br>Input a 1 ms marker signal into CH1 INPUT.<br>Adjust VR201 so that the peak of the marker signal matches the CRT scale divided in 1 div. |
| 10 $\mu$s Range Sweep Time | TC101<br>TC201 | X74-1490 | SWEEP TIME/DIV : 10 $\mu$s<br>Input a 10 $\mu$s marker signal into CH1 INPUT, and adjust in the same way as for 1 $\mu$s adjustment. |
| $\times$10 MAG Gain | VR302 | X74-1490 | HORIZONTAL MODE : A<br>A SWEEP TIME/DIV : 1 ms<br>Input a 1 ms marker signal into CH1 INPUT, and match the peak of the marker signal with the CRT scale divided in 1 div.<br>Pull the PULL $\times$10 MAG knob (to set to the $\times$10 MAG status), and adjust VR302 so that the interval between peaks becomes 10 div. |
| $\times$10 MAG Center | VR301 | X74-1490 | A SWEEP TIME/DIV : 1 ms<br>Input a 5 ms marker signal into CH1 INPUT.<br>Pull the PULL $\times$10 MAG knob (to set to the $\times$10 MAG status), and adjust the horizontal POSITION so that the peak of the waveform is at the vertical scale line at the center of the CRT.<br>Push the PULL $\times$10 MAG knob (to release the $\times$10 MAG mode) and adjust VR301 so that the peak of the waveform matches the vertical scale line at the center of the CRT. |

# ADJUSTMENT

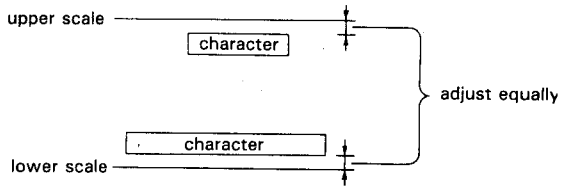
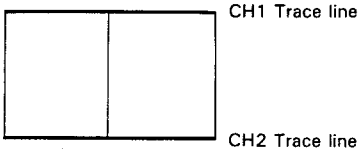
| Item | Adjustment VR (TC) | P.C.B. | Procedure |
|---|---|---|---|
| Delay Time Position | VR203<br>VR204 | X74-1490 | HORIZONTAL MODE : ALT<br>A SWEEP TIME/DIV : 0.1 ms<br>B SWEEP TIME/DIV : 1 μs<br>Operate ◄► POSITION to bring the starting point of A trace to the left end of the graticule line on the CRT screen.<br>Adjust VR203 so that B trace may appear on 0.2 div position when rotated the DELAY TIME POSITION control to counter-clockwise.<br>Adjust VR204 so that B trace may appear on 10.2 div position when rotated the DELAY TIME POSITION control to clockwise.<br>Repeat above 2 or 3 times. |
| X Position Center | VR3 | X74-1490 | Adjust the horizontal POSITION knob so that the sweep start point moves to the vertical scale line at the left end of CRT.<br>Switch to the X-Y mode and adjust VR3 to bring the spot to the center of CRT screen. |

### 5. OVERSHOOT AND CAL ADJUSTMENTS

| Item | Adjustment VR (TC) | P.C.B. | Procedure |
|---|---|---|---|
| Overshoot | <For CH1><br>VR205<br>TC203<br>VR203<br>TC201<br>TC202<br>VR8<br>TC6<br>VR2<br>TC5<br><For CH2><br>VR108<br>TC106<br>VR102<br>TC105 | X73-1790 | CH1, 2 VOLTS/DIV : 5 mV<br>CH1, 2 AC-GND-DC : DC<br>SWEEP TIME/DIV : 0.2 μs<br>PULL X10 MAG : PULL<br>CH1/2 ATT : 6 mV/div.<br>AC-GND-DC : DC<br>Sweep time : 0.2 μs/div.<br>Connect the oscilloscope to CH1 OUT on the rear. (5 mV/div range)<br>Input a 1 MHz square wave signal to CH1 INPUT 6 divisions.<br>• Perform a rough adjustment in the following procedure so as to suppress overshoot down to as less as possible.<br>1. VR205 and TC203 for low frequency band.<br>2. VR203, TC201 and TC202 for middle to high frequency band.<br>3. VR5 and TC6 for middle frequency band.<br>• Set the square wave at CH1 OUT to a quantity of 6 divisions, and adjust VR2 and TC5 so that the square wave at CH1 out is formed as shown on the right.<br>• Adjust the waveform in the following procedure.<br>1. VR8 and TC6 for middle frequency band.<br>2. VR203, TC201 and TC202 for middle to high frequency band.<br>3. VR205 and TC203 for low frequency band.<br>• Input a 1 MHz square wave signal to CH2 INPUT 6 divisions.<br>• Adjust the waveform.<br>1. TC106 and VR108 for middle frequency band.<br>2. TC105 and VR102 for high frequency band.<br>After adjustment, check if the frequency response is adequate in more than 4.8 divisions. |
| CAL Adjustment | VR351 | X73-1790 | Connect the oscilloscope to the CAL terminal and set it to 0.2 V/div. Adjust VR351 so that the amplitude is of 5 divisions for 40 MHz input. |

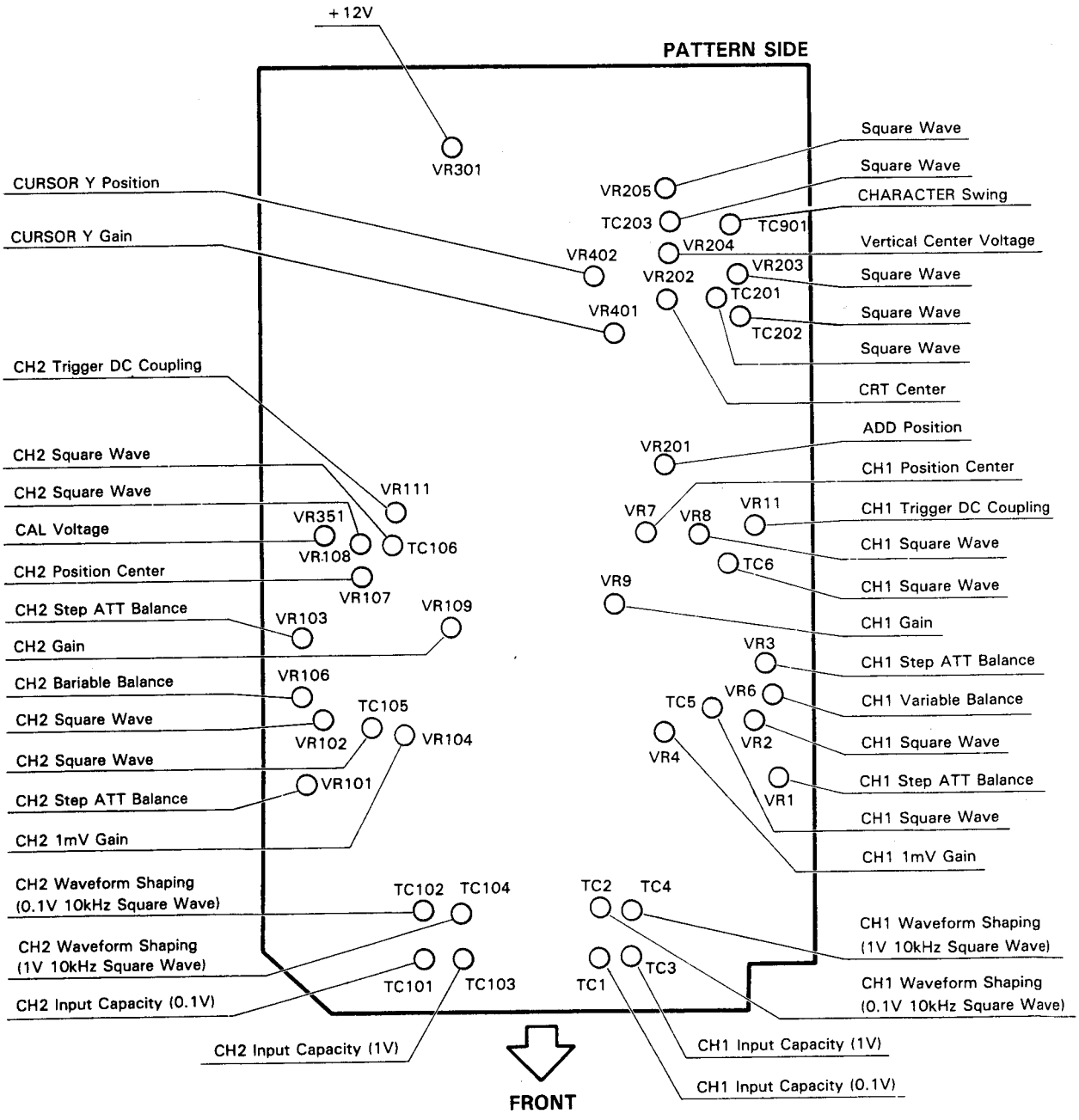
# ADJUSTMENT

## 6. CURSOR SECTION ADJUSTMENT

| Item | Adjustment VR (TC) | P.C.B. | Procedure |
|---|---|---|---|
| Cursor Y Gain and Position | VR401<br>VR402 | X73-1790 | CURSORS : ΔV1<br>Δ : Turn fully clockwise<br>ΔREF : Turn fully counterclockwise<br>Adjust VR401 so that the interval between cursors becomes 8 div.<br>Adjust VR402 so that the two cursors move to the upper and lower ends of the horizontal scale line in the CRT.<br>If it is impossible, adjust the interval between cursors and the horizontal scale line becomes the same for both upper and lower ends. |
| R/O CHARACTER Position | VR2 | X77-1510 | Use VR2 to adjust the read out characters so that they have same distance from that upper and lower scales of the screen.<br>  |
| Cursor X Gain and Position | VR501<br>VR502 | X74-1490 | CURSORS : ΔT<br>Δ : Turn fully clockwise<br>ΔREF : Turn fully counterclockwise<br>Adjust VR501 so that the interval between two cursors becomes 10 div.<br>Adjust VR502 so that the two cursors move onto the vertical scale lines at the left the right ends of CRT. |
| R/O Cursor Length | VR1 | X77-1510 | CURSORS : ΔV1<br>Adjust VR1 to bring the left end of the cursor on the vertical scale line at the first division to the right of the left side of CRT screen. |
| CHARACTER Swing | TC901 | X73-1790 | CURSORS : ΔT<br>HORIZ MODE : ALT<br>A SWEEP TIME/DIV : 5 ms<br>  <br>Adjust the CH1 and CH2 trace lines with the ▲▼ POSI. as shown in the right sketch, then, adjust with TC901 so that the longitudinal direction swing of the readout characters disappears. When the SWEEP TIME is 5 to 1 μs, make sure that no character swing appears. |

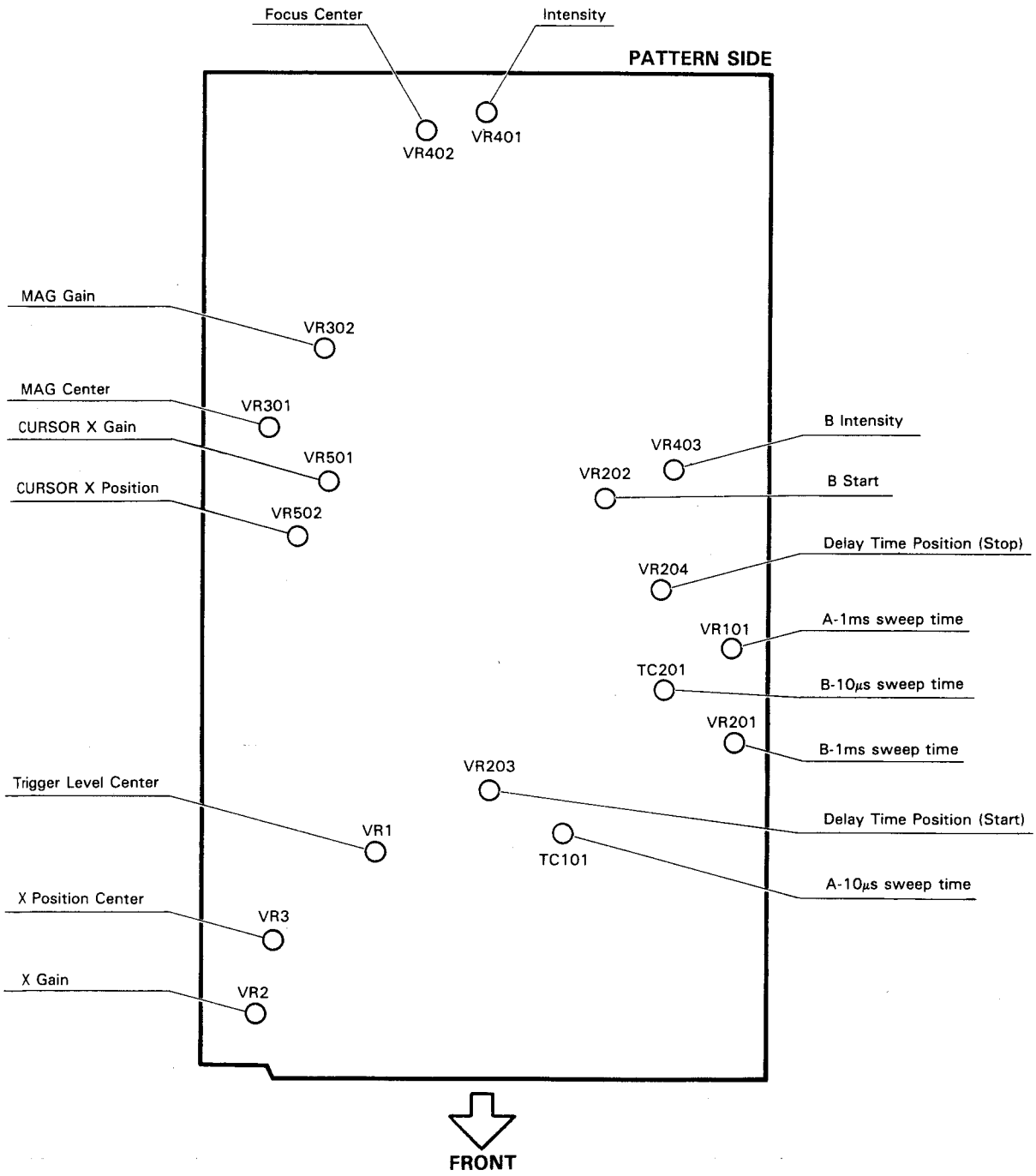
# ADJUSTMENT

## VERTICAL UNIT (X73-1790-01)



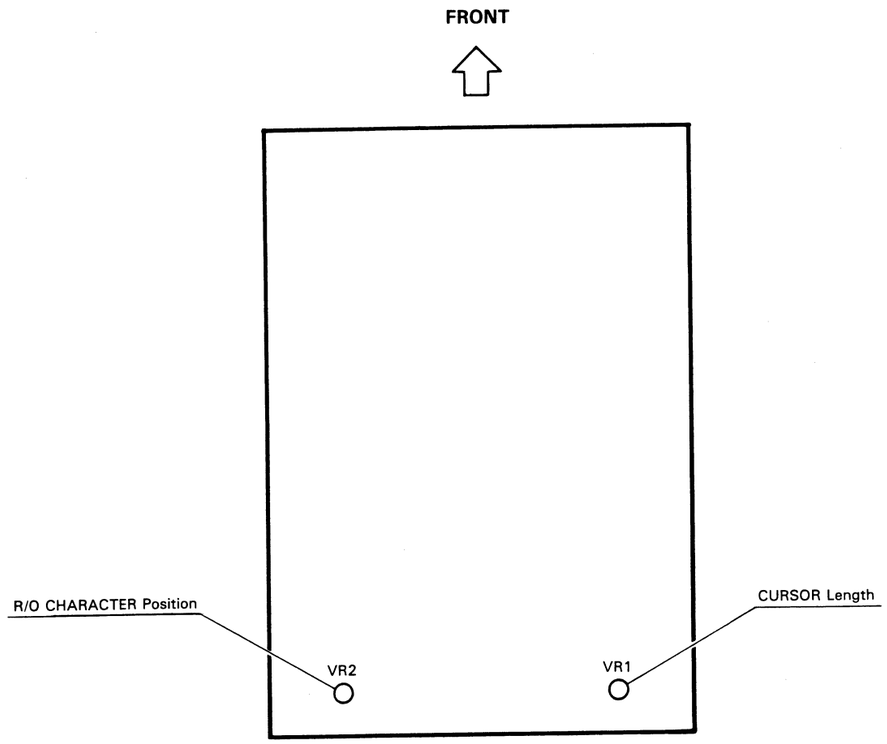
# ADJUSTMENT

## HORIZONTAL UNIT (X74-1490-01)

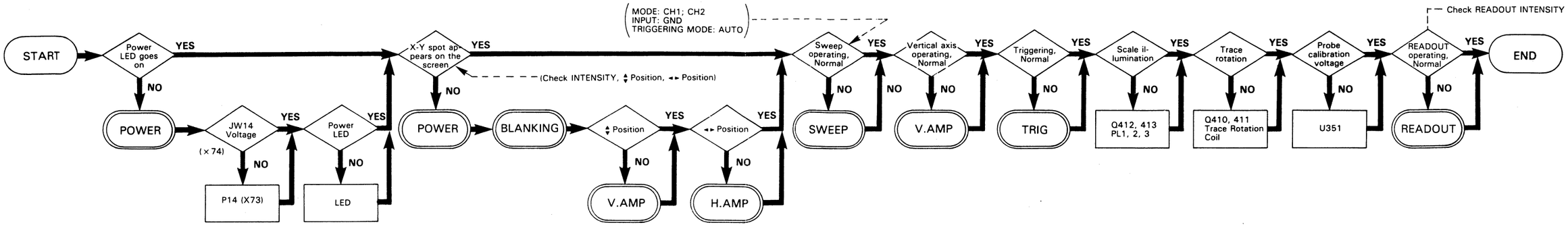


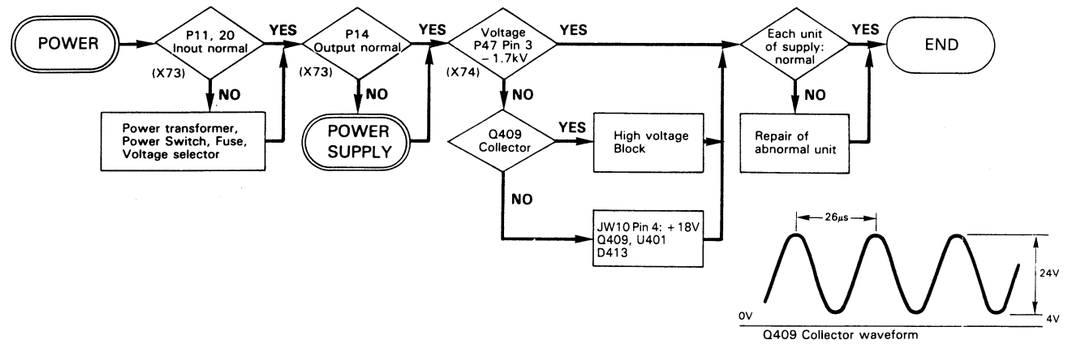
# ADJUSTMENT

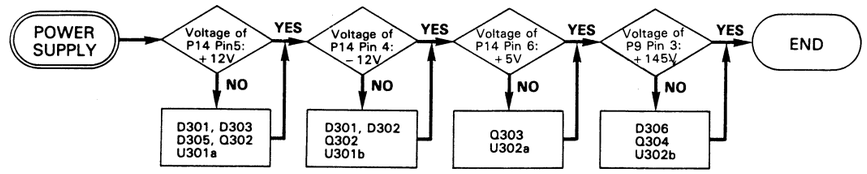
R/O UNIT (X77-1510-00)

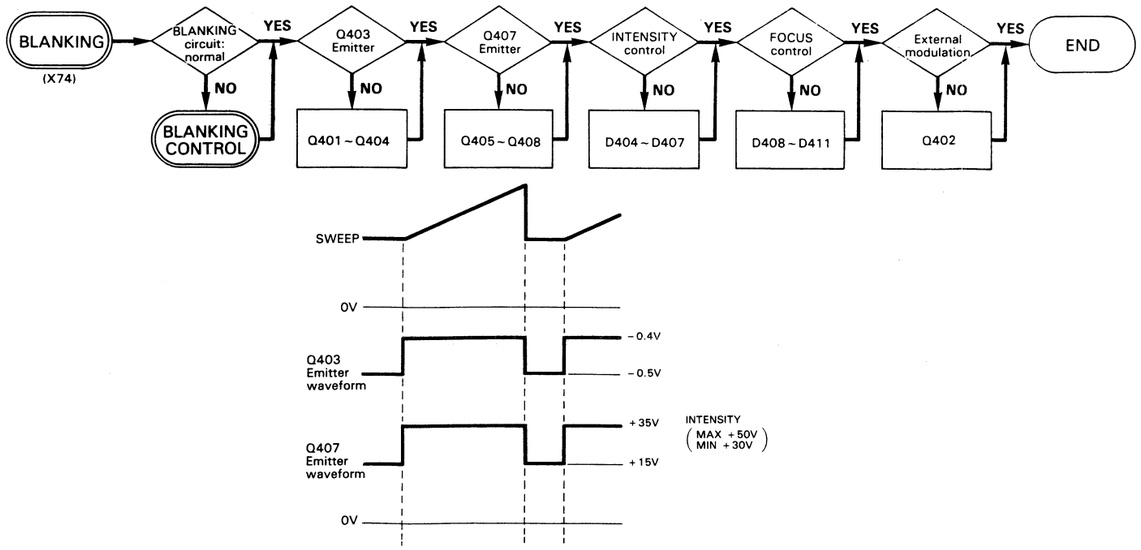


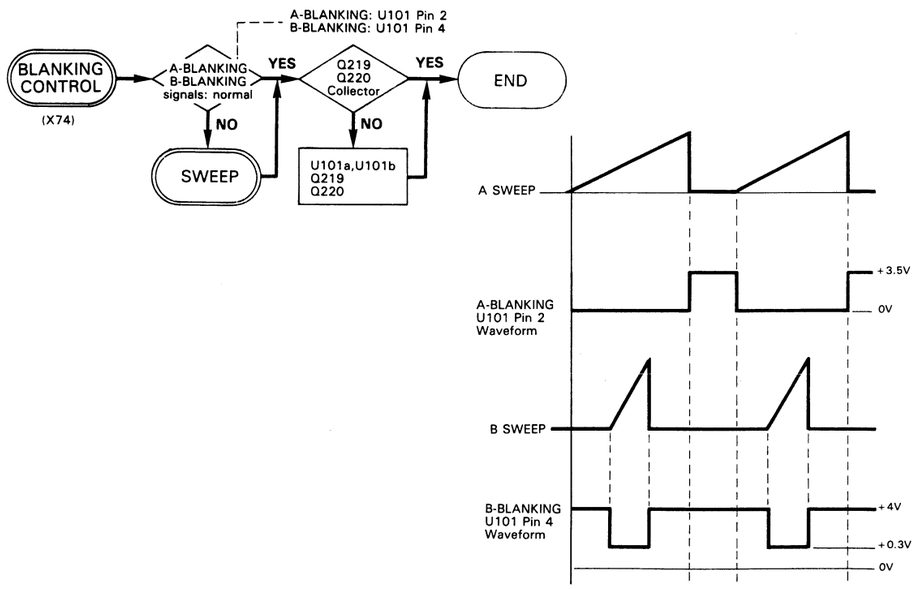
# TROUBLESHOOTING



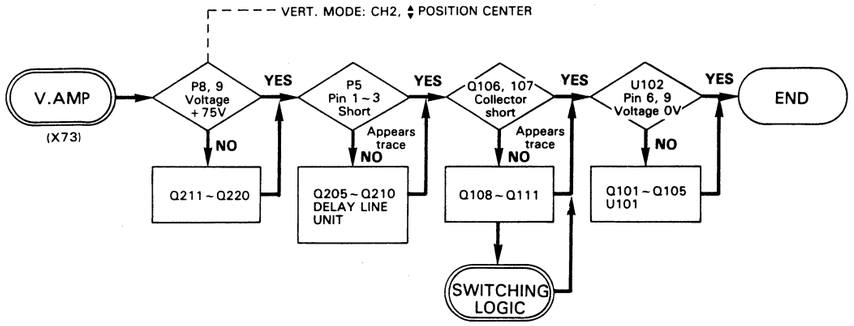



# TROUBLESHOOTING



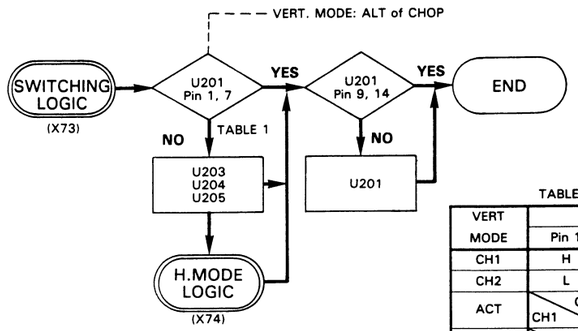
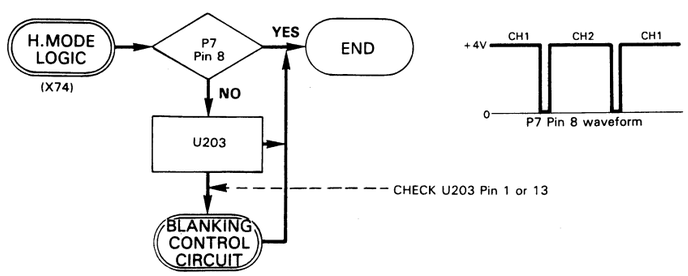
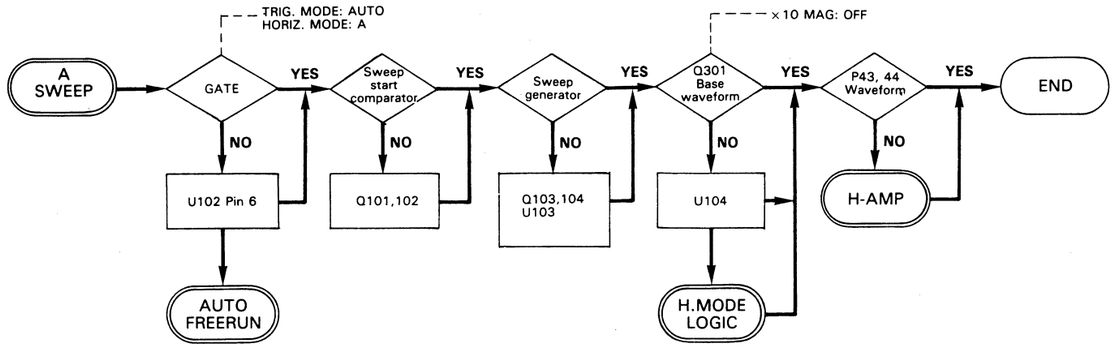
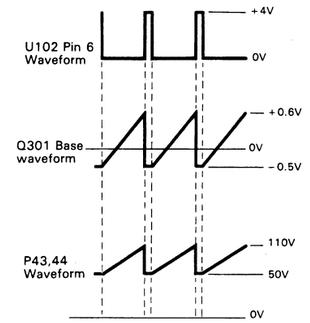



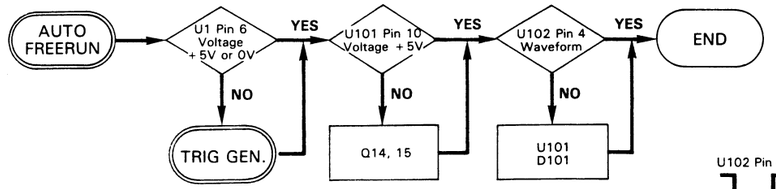

TABLE 1

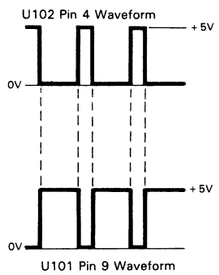
| VERT MODE | U201 Pin 1 | U201 Pin 7 |
|---|---|---|
| CH1 | H | H |
| CH2 | L | L |
| ACT | CH1: CH2 / CH2: CH1 | CH1: CH2 / CH2: CH1 |
| CHOD | CH1: CH2 / CH2: CH1 | CH1: CH2 / CH2: CH1 |
| ADD | L | H |



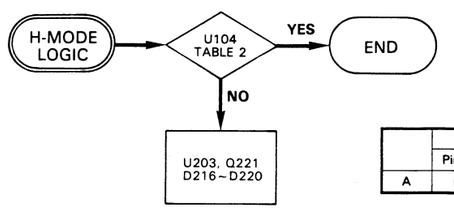
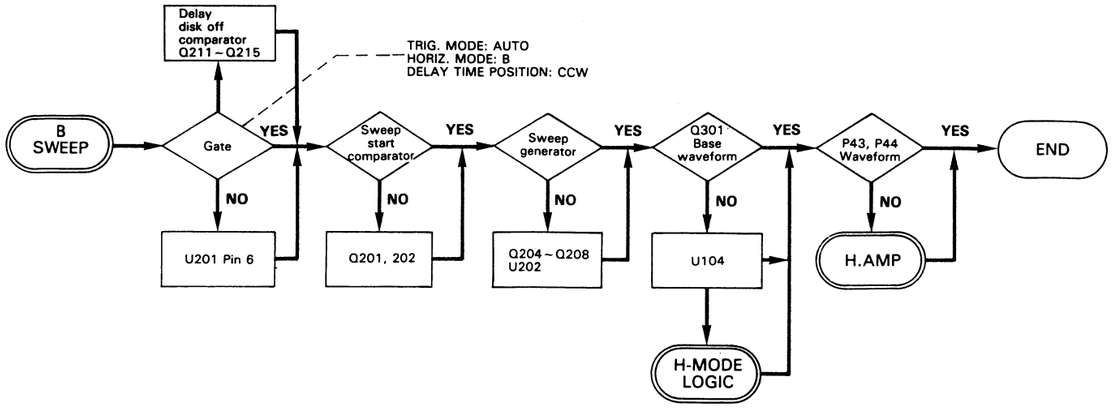
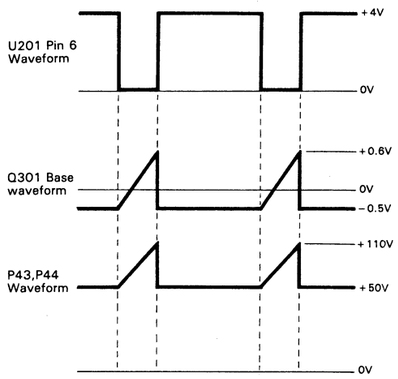




TABLE 2

| | U104 Pin 9 | U104 Pin 10 | U104 Pin 11 | U104 Pin 15 |
|---|---|---|---|---|
| A | H | H | L | L |

# TROUBLESHOOTING



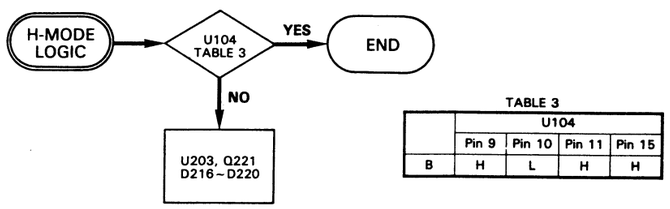
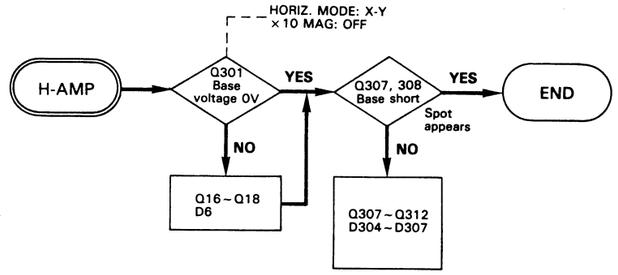
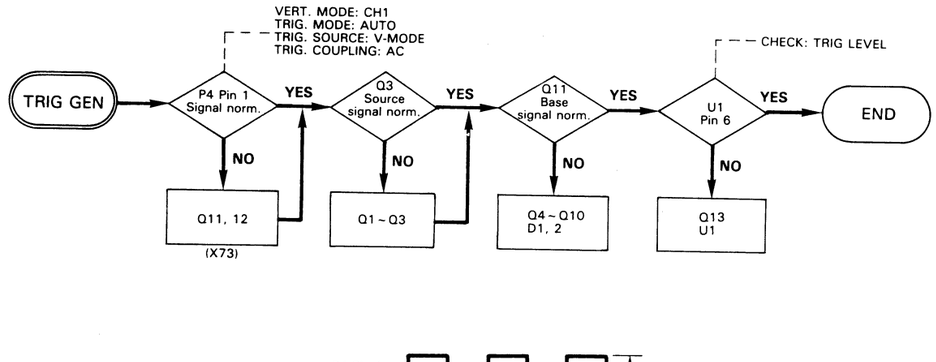
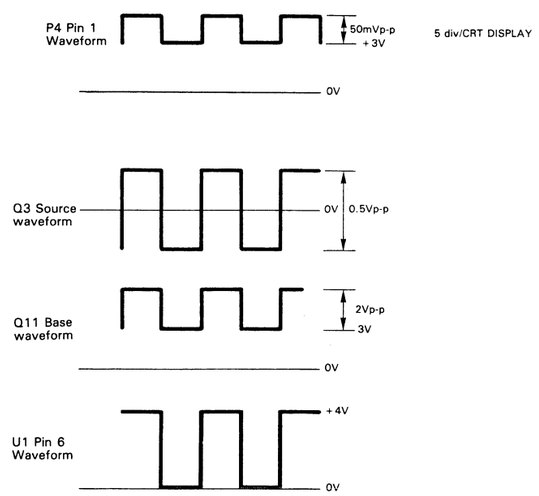




TABLE 3

| | U104 | | | |
|---|---|---|---|---|
| | Pin 9 | Pin 10 | Pin 11 | Pin 15 |
| B | H | L | H | H |

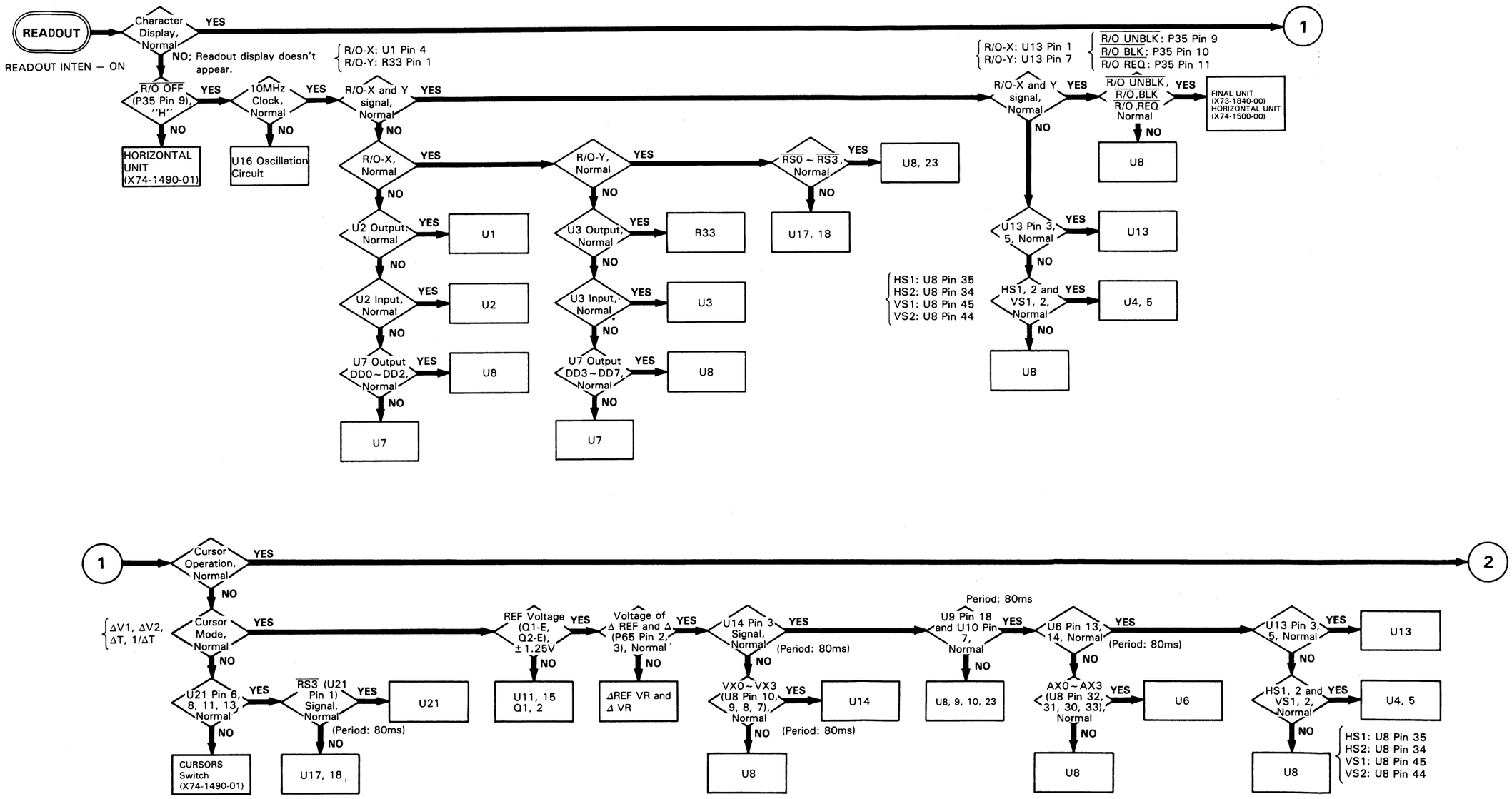


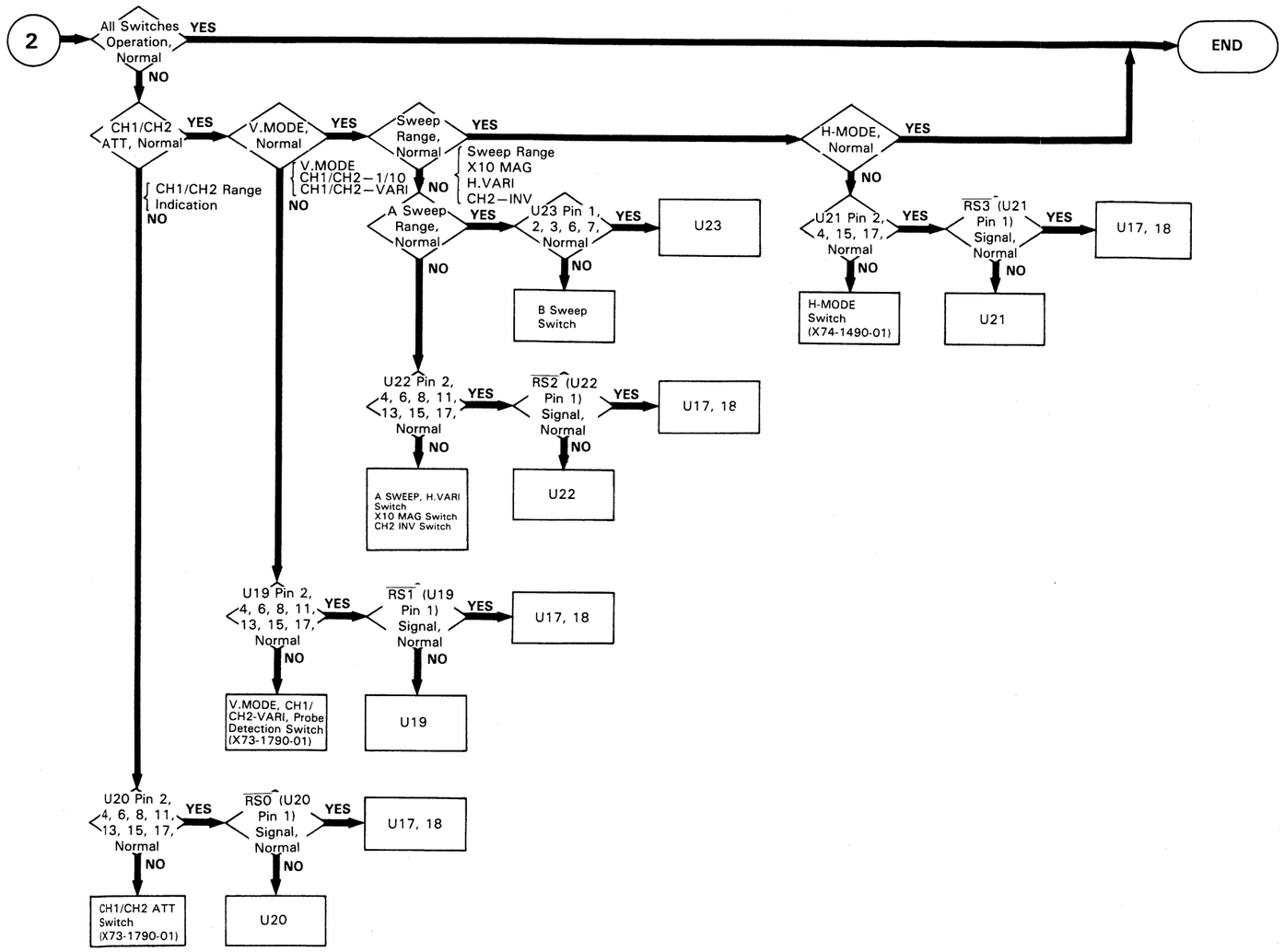



# TROUBLESHOOTING

## READOUT SECTION




2
All Switches Operation, Normal
YES
NO
END
CH1/CH2 ATT, Normal
YES
CH1/CH2 Range Indication
NO
V.MODE, Normal
YES
V.MODE CH1/CH2—1/10 CH1/CH2—VARI
NO
Sweep Range, Normal
YES
Sweep Range X10 MAG H.VARI CH2—INV
NO
A Sweep Range, Normal
YES
U23 Pin 1, 2, 3, 6, 7, Normal
YES
U23
NO
B Sweep Switch
NO
H-MODE, Normal
YES
NO
U21 Pin 2, 4, 15, 17, Normal
YES
RS3 (U21 Pin 1) Signal, Normal
YES
U17, 18
NO
H-MODE Switch (X74-1490-01)
NO
U21
U22 Pin 2, 4, 6, 8, 11, 13, 15, 17, Normal
YES
RS2 (U22 Pin 1) Signal, Normal
YES
U17, 18
NO
A SWEEP, H.VARI Switch X10 MAG Switch CH2 INV Switch
NO
U22
U19 Pin 2, 4, 6, 8, 11, 13, 15, 17, Normal
YES
RS1 (U19 Pin 1) Signal, Normal
YES
U17, 18
NO
V.MODE, CH1/CH2-VARI, Probe Detection Switch (X73-1790-01)
NO
U19
U20 Pin 2, 4, 6, 8, 11, 13, 15, 17, Normal
YES
RS0 (U20 Pin 1) Signal, Normal
YES
U17, 18
NO
CH1/CH2 ATT Switch (X73-1790-01)
NO
U20

# TROUBLESHOOTING

## READOUT SIGNAL TABLE

### (1) CH1 (CH2) Vertical Attenuator

| VOLTS/DIV | U20 Pin 13 (17) "ATT3" | U20 Pin 6 (2) "ATT2" | U20 Pin 11 (15) "ATT1" | U20 Pin 8 (4) "ATT0" | Display |
|---|---|---|---|---|---|
| 1 mV | 1 | 1 | 1 | 1 | CH1 (CH2) 1 mV |
| 2 mV | 1 | 1 | 1 | 0 | CH1 (CH2) 2 mV |
| 5 mV | 1 | 1 | 0 | 1 | CH1 (CH2) 5 mV |
| 10 mV | 1 | 1 | 0 | 0 | CH1 (CH2) 10 mV |
| 20 mV | 1 | 0 | 1 | 1 | CH1 (CH2) 20 mV |
| 50 mV | 1 | 0 | 1 | 0 | CH1 (CH2) 50 mV |
| 0.1 V | 1 | 0 | 0 | 1 | CH1 (CH2) 0.1 V |
| 0.2 V | 1 | 0 | 0 | 0 | CH1 (CH2) 0.2 V |
| 0.5 V | 0 | 1 | 1 | 1 | CH1 (CH2) 0.5 V |
| 1 V | 0 | 1 | 1 | 0 | CH1 (CH2) 1 V |
| 2 V | 0 | 1 | 0 | 1 | CH1 (CH2) 2 V |
| 5V | 0 | 1 | 0 | 0 | CH1 (CH2) 5 V |

### (2) CH1 (CH2) Vertical Gain VARIABLE

| V. VARIABLE | U19 Pin 8 (11) "CH1 (CH2)/VARI" | Display |
|---|---|---|
| CAL | 1 | Space |
| UNCAL | 0 | > |

### (3) CH1 (CH2) Probe

| Probe | U19 Pin 6 (13) "CH1 (CH2)/PROBE" | Display |
|---|---|---|
| 1/1 | 1 | VOLTS/DIV ×1 Indication |
| 1/10 | 0 | VOLTS/DIV ×10 Indication |

### (4) CH2 Polarity

| Polarity (PULL INV) | U22 Pin 17 "CH2/INV" | Display |
|---|---|---|
| Normal | 1 | Space |
| Invert | 0 | ↓ |

### (5) Vertical MODE

| MODE | U19 Pin 17 "V.MODE 3" | U19 Pin 2 "V.MODE 2" | U19 Pin 15 "V.MODE 1" | U19 Pin 4 "V.MODE 0" | Display |
|---|---|---|---|---|---|
| CH1 | 1 | 1 | 1 | 1 | CH1 |
| CH2 | 1 | 1 | 1 | 0 | CH2 |
| ATL | 1 | 1 | 0 | 1 | CH1 CH2 |
| CHOP | 1 | 0 | 1 | 1 | CH1 CH2 |
| ADD | 0 | 1 | 1 | 1 | CH1 + CH2 |

### (6) A Sweep Range

| SWEEP TIME/DIV | U22 Pin 4 "SWEEP 4" | U22 Pin 13 "SWEEP 3" | U22 Pin 6 "SWEEP 2" | U22 Pin 11 "SWEEP 1" | U22 Pin 8 "SWEEP 0" | Display |
|---|---|---|---|---|---|---|
| 0.5 s | 1 | 1 | 1 | 0 | 0 | A: 0.5 s |
| 0.2 s | 1 | 1 | 0 | 1 | 1 | A: 0.2 s |
| 0.1 s | 1 | 1 | 0 | 1 | 0 | A: 0.1 s |
| 50 ms | 1 | 1 | 0 | 0 | 1 | A: 50 ms |
| 20 ms | 1 | 1 | 0 | 0 | 0 | A: 20 ms |
| 10 ms | 1 | 0 | 1 | 1 | 1 | A: 10 ms |
| 5 ms | 1 | 0 | 1 | 1 | 0 | A: 5 ms |
| 2 ms | 1 | 0 | 1 | 0 | 1 | A: 2 ms |
| 1 ms | 1 | 0 | 1 | 0 | 0 | A: 1 ms |
| 0.5 ms | 1 | 0 | 0 | 1 | 1 | A: 0.5 ms |
| 0.2 ms | 1 | 0 | 0 | 1 | 0 | A: 0.2 ms |
| 0.1 ms | 1 | 0 | 0 | 0 | 1 | A: 0.1 ms |
| 50 μs | 1 | 0 | 0 | 0 | 0 | A: 50 μs |
| 20 μs | 0 | 1 | 1 | 1 | 1 | A: 20 μs |
| 10 μs | 0 | 1 | 1 | 1 | 0 | A: 10 μs |
| 5 μs | 0 | 1 | 1 | 0 | 1 | A: 5 μs |
| 2 μs | 0 | 1 | 1 | 0 | 0 | A: 2 μs |
| 1 μs | 0 | 1 | 0 | 1 | 1 | A: 1 μs |
| 0.5 μs | 0 | 1 | 0 | 1 | 0 | A: 0.5 μs |
| 0.2 μs | 0 | 1 | 0 | 0 | 1 | A: 0.2 μs |
| 0.1 μs | 0 | 1 | 0 | 0 | 0 | A: 0.1 μs |
| 50 ns | 0 | 0 | 1 | 1 | 1 | A: 50 ns |

### (7) Horizontal Magnification

| Magnification (PULL ×10 MAG | U22 Pin 15 "H-MAG" | Display |
|---|---|---|
| Normal | 1 | SWEEP TIME/DIV ×1 Indication |
| ×10 MAG | 0 | SWEEP TIME/DIV ×1/10 Indication |

### (8) Sweep Time VARIABLE

| H.VARIABLE | U22 Pin 2 "H-VARI" | Display |
|---|---|---|
| CAL | 1 | Space |
| UNCAL | 0 | > |

### (9) Horizontal MODE

| H.MODE | U21 Pin 4 "X-Y" | Display |
|---|---|---|
| Sweep | 1 | Space |
| X-Y | 0 | X-Y |

### (10) Cursor MODE

| CURSORS | U21 Pin 13 "CURSOR-MODE 3" | U21 Pin 6 "CURSOR-MODE 2" | U21 Pin 11 "CURSOR-MODE 1" | U21 Pin 8 "CURSOR-MODE 0" | Display |
|---|---|---|---|---|---|
| OFF | 1 | 1 | 1 | 1 | No Cursor Line |
| ΔV1 | 1 | 1 | 1 | 0 | Two Horizontal Cursor Lines |
| ΔV2 | 1 | 1 | 0 | 1 | Two Horizontal Cursor Lines |
| ΔT | 1 | 0 | 1 | 1 | Two Vertacal Cursor Lines |
| 1/ΔT | 0 | 1 | 1 | 1 | Two Vertical Cursor Lines |

### B Sweep Range

| SWEEP TIME/DIV | U23 Pin 7 "SWEEP 4" | U23 Pin 6 "SWEEP 3" | U23 Pin 3 "SWEEP 2" | U23 Pin 2 "SWEEP 1" | U23 Pin 1 "SWEEP 0" | Display |
|---|---|---|---|---|---|---|
| 50 ms | 1 | 1 | 0 | 0 | 1 | B: 50 ms |
| 20 ms | 1 | 1 | 0 | 0 | 0 | B: 20 ms |
| 10 ms | 1 | 0 | 1 | 1 | 1 | B: 10 ms |
| 5 ms | 1 | 0 | 1 | 1 | 0 | B: 5 ms |
| 2 ms | 1 | 0 | 1 | 0 | 1 | B: 2 ms |
| 1 ms | 1 | 0 | 1 | 0 | 0 | B: 1 ms |
| 0.5 ms | 1 | 0 | 0 | 1 | 1 | B: 0.5 ms |
| 0.2 ms | 1 | 0 | 0 | 1 | 0 | B: 0.2 ms |
| 0.1 ms | 1 | 0 | 0 | 0 | 1 | B: 0.1 ms |
| 50 μs | 1 | 0 | 0 | 0 | 0 | B: 50 μs |
| 20 μs | 0 | 1 | 1 | 1 | 1 | B: 20 μs |
| 10 μs | 0 | 1 | 1 | 1 | 0 | B: 10 μs |
| 5 μs | 0 | 1 | 1 | 0 | 1 | B: 5 μs |
| 2 μs | 0 | 1 | 1 | 1 | 0 | B: 2 μs |
| 1 μs | 0 | 1 | 0 | 1 | 1 | B: 1 μs |
| 0.5 μs | 0 | 1 | 0 | 1 | 0 | B: 0.5 μs |
| 0.2 μs | 0 | 1 | 0 | 0 | 1 | B: 0.2 μs |
| 0.1 μs | 0 | 1 | 0 | 0 | 0 | B: 0.1 μs |
| 50 ns | 0 | 0 | 1 | 1 | 1 | B: 50 ns |

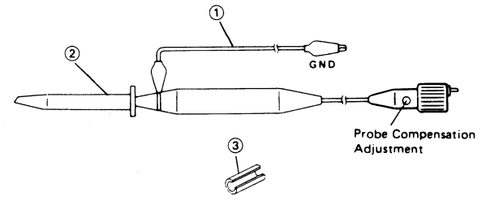
# PARTS LIST

## CS-5130 UNIT

## Y70-1620-00

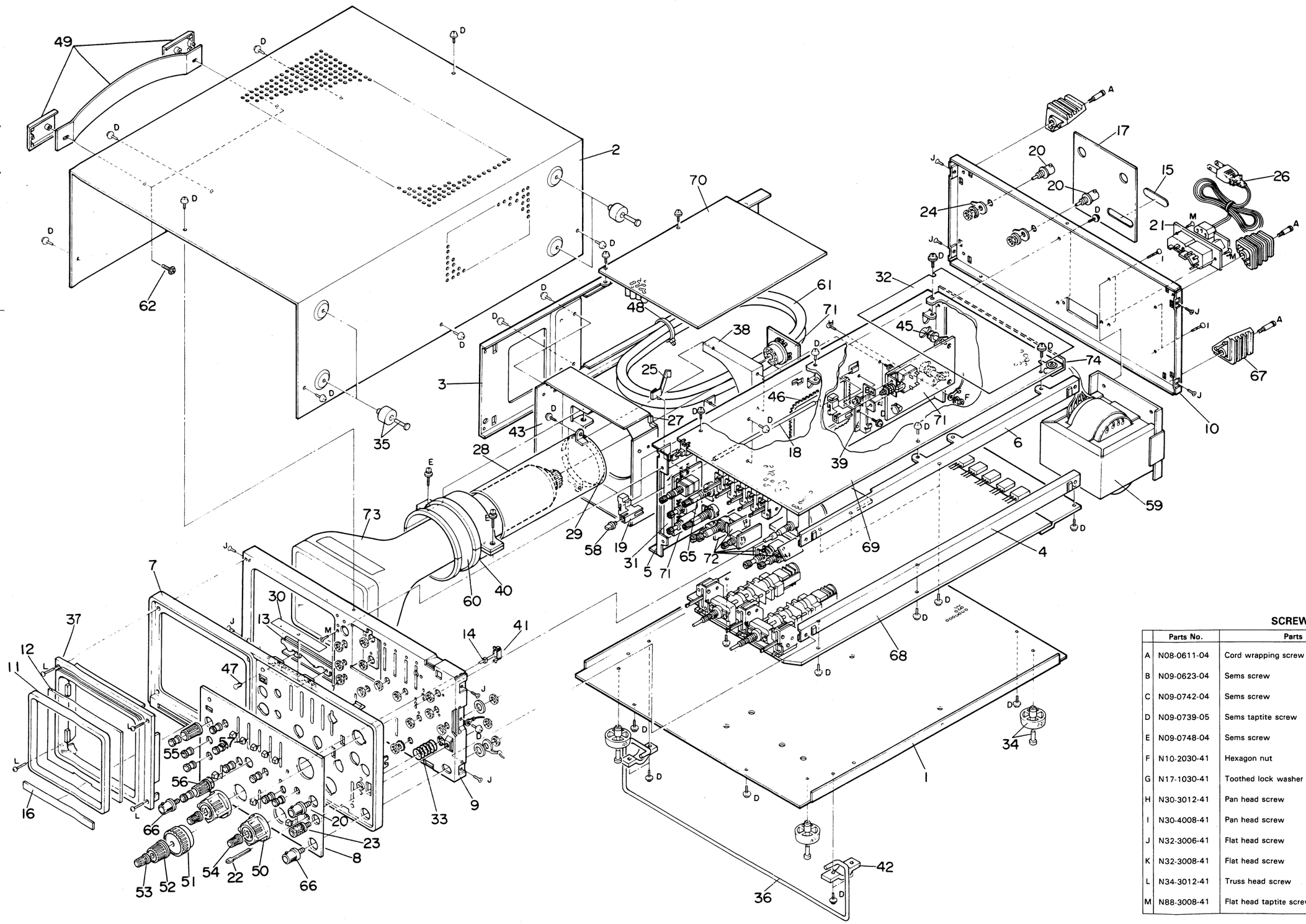
| REF.NO | PARTS NO | NAME & DESCRIPTION |
|---|---|---|
| | A20-2829-03 | PANEL ASS'Y |
| | B30-0952-05 | LAMP (T4.2 8V 0.15A) |
| | B41-0710-04 | CAUTION LABEL (HIGH VOLTAGE) |
| | B50-7666-10 | INSTRUCTION MANUAL,JAPANESE |
| | B50-7667-20 | INSTRUCTION MANUAL,ENGLISH |
| | E31-0564-05 | WIRE ASS'Y(GND GREEN) |
| | E31-2861-05 | WIRE ASS'Y (INLET-FILTER P69) |
| | E31-5501-05 | WIRE ASS'Y(CH1 BNC P18) |
| | E31-5502-05 | WIRE ASS'Y(CH1 OUT P1) |
| | E31-5506-05 | WIRE ASS'Y(CH2 BNC P19) |
| | E31-5509-05 | WIRE ASS'Y(CAL) |
| | E31-5511-05 | WIRE ASS'Y(FOR P21) |
| | E31-5516-05 | WIRE ASS'Y(EXT. TRIG) |
| | E31-5519-05 | WIRE ASS'Y(READY LED) |
| | E31-5526-05 | WIRE ASS'Y(Z AXIS P45) |
| | E31-5537-05 | WIRE ASS'Y(CURSOR VR P65) |
| | E31-5549-05 | WIRE ASS'Y(FOR P30,50,52) |
| | F05-1023-05 | FUSE(6X30MM) 1A |
| | F05-5013-05 | FUSE(6X30MM) 0.5A |
| | F05-5016-05 | FUSE(5X20MM) 500MAT |
| | H01-5888-04 | CARTON BOX |
| | H10-2828-12 | FOAMED STYRENE PAD (FRONT) |
| | H10-2829-12 | FOAMED STYRENE PAD (REAR) |
| | H20-1727-04 | VINYL COVER |
| | H25-0029-04 | POLYETHYLENE BAG (FUSE) |
| | J61-0408-05 | WIRE WRAPPING BAND |
| | W03-2307-05 | R/O PROBE (PC-33) |
| C1 | CC45CH1H101J | CAP. CERAMIC 100P 5% 50V |
| C2 | CC45CH1H101J | CAP. CERAMIC 100P 5% 50V |
| R1 | RD14BB2E220J | RES. CARBON 22 5% 1/4W |
| R2 | RD14BB2E220J | RES. CARBON 22 5% 1/4W |
| 1 | A01-1154-22 | CASE(BOTTOM) |
| 2 | A01-1193-02 | CASE(TOP) |
| 3 | A13-0914-02 | FRAME (L) |
| 4 | A13-0917-02 | FRAME (R.LOWER) |
| 5 | A13-0922-22 | FRAME (CENTER) |
| 6 | A13-0923-02 | FRAME(R.UPPER) |
| 7 | A20-2822-21 | MOLDED PANEL |
| 8 | A21-1137-03 | DECORATIVE PANEL |
| 9 | A22-0870-02 | SUB PANEL |
| 10 | A23-1682-02 | REAR PANEL |
| 11 | B07-0716-03 | FILTER FRAME |
| 12 | B19-0749-04 | FILTER |
| 13 | B30-0951-25 | SCALE ILLUMI LAMP ASS'Y |
| 14 | B30-0957-05 | LED (LN322GPT) |
| 15 | B40-2765-04 | NAME PLATE (SERIAL NO) |
| 16 | B40-2910-03 | NAME PLATE(MODEL) |
| 17 | B41-0803-04 | CAUTION LABEL |
| 18 | D21-0915-04 | EXTENSION SHAFT |
| 19 | D22-0501-04 | JOINT & COUPLING |
| 20 | E04-0259-05 | BNC RECEPTACLE |
| 21A | E18-0365-05 | AC SELECTOR WITH 6X30MM FUSE |
| 21B | E18-0366-15 | AC SELECTOR WITH 5X20MM FUSE |
| 22 | E21-0660-04 | TERMINAL,CAL |
| 23 | E21-0667-05 | METAL TERMINAL |
| 24 | E23-0513-05 | EARTH LUG,BNC |
| 25 | E23-0552-04 | EARTH TERMINAL |
| 26A | E30-1818-05 | JIS POWER CORD |
| 26B | E30-1819-05 | CEE POWER CORD |
| 26C | E30-1820-05 | UL/CSA POWER CORD |
| 26D | E30-1821-05 | SAA POWER CORD |
| 26E | E30-1644-15 | BS POWER CORD |
| 27 | F09-0512-04 | EDGING |
| 28 | F11-1206-03 | CRT SHIELD |
| 29 | F15-0733-04 | FELT (CRT SHIELD) |
| 30 | F20-0658-04 | INSULATED SHEET |
| 31 | F20-0667-04 | INSULATED SHEET |
| 32 | F20-0685-14 | INSULATED SHEET |
| 33 | G01-0909-04 | COIL SPRING (CAL SHIELD) |
| 34 | J02-0089-05 | RUBBER FOOT(REAR) |
| 35 | J02-0512-05 | FOOT(SMALL) |
| 36 | J02-0515-04 | TILT STAND |
| 37 | J10-0418-12 | BEZEL |
| 38 | J19-1651-04 | BLACKET |
| 39 | J19-1652-04 | BLACKET FOR P.C.B. |
| 40 | J19-1653-23 | HOLDER FOR CRT |
| 41 | J19-1654-14 | HOLDER FOR LED |
| 42 | J21-2573-04 | HOLDER FOR LEG |
| 43 | J21-4594-23 | BRACKET FOR CRT |
| 45 | J61-0516-05 | SUPPORT |
| 46 | J42-0533-04 | BUSHING (FREE) |
| 47 | J59-0403-05 | NYLON RIVET (ILLUMI) |
| 48 | J61-0509-05 | WIRE WRAPPING BAND |
| 49 | K01-0409-05 | HANDLE |
| 50 | K21-0892-03 | KNOB (VOLTS/DIV) |
| 51 | K21-0895-13 | KNOB |
| 52 | K21-0896-13 | KNOB |
| 53 | K21-0897-14 | KNOB |
| 54 | K21-0899-04 | KNOB |
| 55 | K23-0808-03 | KNOB |
| 56 | K23-0809-03 | KNOB |
| 57 | K27-0537-04 | KNOB,FOR LEVER SWITCH |
| 58 | K27-0538-04 | KNOB (FOR PUSH SWITCH) |
| 59 | L01-9746-05 | POWER TRANSFORMER |
| 60 | L39-0526-25 | ROTATOR COIL |
| 61 | L76-0114-05 | DELAY LINE |
| 62 | N09-0777-05 | SEMS SCREW(M4X6) |
| 65 | R29-1501-05 | V.R. 1KB |
| 66 | E04-0260-05 | BNC RECEPTACLE (READOUT) |
| 67 | W01-0503-04 | REAR RUBBER FOOT/CORD WRAP |
| 68 | X73-1790-01 | VERTICAL UNIT |
| 69 | X74-1490-01 | HORIZONTAL UNIT |
| 70 | X77-1510-00 | READOUT UNIT |
| 71 | X80-1060-03 | LINE FILTER UNIT |
| 72 | X81-2710-00 | VR UNIT |
| 73 | 150VTM31 | CRT |
| 74 | A13-0942-13 | FRAME |

## MODEL PC-33 (LOW CAPACITY PROBE)




| ITEM | DESCRIPTION | PARTS NO. |
|---|---|---|
| ① | Ground Wire Assembly | E30-1883-08 |
| ② | Retractable Hook Tip | E29-0540-08 |
| ③ | Marker (Orange) | B42-1950-08 |

# DISASSEMBLY




## SCREWS

| | Parts No. | Parts Name | | Figure |
|---|---|---|---|---|
| A | N08-0611-04 | Cord wrapping screw | | |
| B | N09-0623-04 | Sems screw | (M3×8) | |
| C | N09-0742-04 | Sems screw | (M3×8) | |
| D | N09-0739-05 | Sems taptite screw | (3×8) | |
| E | N09-0748-04 | Sems screw | (M4×12) | |
| F | N10-2030-41 | Hexagon nut | | |
| G | N17-1030-41 | Toothed lock washer | | |
| H | N30-3012-41 | Pan head screw | (M3×12) | |
| I | N30-4008-41 | Pan head screw | (M4×6) | |
| J | N32-3006-41 | Flat head screw | (M3×6) | |
| K | N32-3008-41 | Flat head screw | (M3×8) | |
| L | N34-3012-41 | Truss head screw | (M3×12) | |
| M | N88-3008-41 | Flat head taptite screw | (3×8) | |

# PARTS LIST

## VERTICAL UNIT

## X73-1790-01

| REF.NO | PARTS NO | NAME & DESCRIPTION | | | |
|---|---|---|---|---|---|
| | E31-5544-05 | WIRE ASS'Y(60),+5V | | | |
| | E31-5545-05 | WIRE ASS'Y(61),+160V | | | |
| | E31-5546-05 | WIRE ASS'Y(62),-12V | | | |
| | E31-5547-05 | WIRE ASS'Y(63),+12V | | | |
| | E31-5548-05 | LEAD WIRE WITH CONNEC. +5V,R/O | | | |
| | F01-0863-03 | HEAT SINK | 169X60XT1.6 | | |
| | F01-0864-04 | HEAT SINK | 61X33XT1 | | |
| | F20-0516-05 | INSULATOR | | | |
| | J25-5258-12 | PCB (UNMOUNTED) | | | |
| | N09-0626-04 | SCREW,SEMS | M3X10 | | |
| | N09-0742-04 | SCREW,SEMS | M3X8 | | |
| | N19-0191-05 | WASHER NONMETAL | | | |
| | R92-0150-05 | JUMPING RES. | ZERO OHM(10MM) | | |
| | R92-1061-05 | JUMPING RES. | ZERO OHM (5MM) | | |
| C001 | C91-0501-05 | CAP. METAL FILM | 0.047 | 10% | 630V |
| C004 | C91-1270-05 | CAP. POLYESTER | 0.001 | 10% | 400V |
| C005 | CC45FCH1H020C | CAP. CERAMIC | 2P | 0.25P | 50V |
| C006 | CK45FB1H102K | CAP. CERAMIC | 1000P | 10% | 50V |
| C007 | CK45FB1H102K | CAP. CERAMIC | 1000P | 10% | 50V |
| C008 | CC45FCH1H150J | CAP. CERAMIC | 15P | 5% | 50V |
| C009 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C010 | CE04EW1H100M | CAP. ELECTRO | 10 | 20% | 50V |
| C011 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C012 | CE04EW1H100M | CAP. ELECTRO | 10 | 20% | 50V |
| C015 | CC45FSL1H151J | CAP. CERAMIC | 150P | 5% | 50V |
| C016 | CC45FCH1H560J | CAP. CERAMIC | 56P | 5% | 50V |
| C017 | CC45FCH1H820J | CAP. CERAMIC | 82P | 5% | 50V |
| C018 | CC45FCH1H820J | CAP. CERAMIC | 82P | 5% | 50V |
| C019 | CC45FCH1H050C | CAP. CERAMIC | 5P | 0.25P | 50V |
| C020 | CC45FCH1H050C | CAP. CERAMIC | 5P | 0.25P | 50V |
| C021 | CC45FCH1H101J | CAP. CERAMIC | 100P | 5% | 50V |
| C022 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C023 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C024 | CC45FCH1H470J | CAP. CERAMIC | 47P | 5% | 50V |
| C025 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C026 | CC45FCH1H470J | CAP. CERAMIC | 47P | 5% | 50V |
| C027 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C028 | NO USE | | | | |
| C029 | CE04BW1E330M | CAP. ELECTRO | 33 | 20% | 25V |
| C030 | CE04EW1H100M | CAP. ELECTRO | 10 | 20% | 50V |
| C031 | CK45FB1H102K | CAP. CERAMIC | 1000P | 10% | 50V |
| C101 | C91-0501-05 | CAP. METAL FILM | 0.047 | 10% | 630V |
| C104 | C91-1270-05 | CAP. POLYESTER | 0.001 | 10% | 400V |
| C105 | CC45FCH1H020C | CAP. CERAMIC | 2P | 0.25P | 50V |
| C106 | CK45FB1H102K | CAP. CERAMIC | 1000P | 10% | 50V |
| C107 | CK45FB1H102K | CAP. CERAMIC | 1000P | 10% | 50V |
| C108 | CC45FCH1H150J | CAP. CERAMIC | 15P | 5% | 50V |
| C109 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C110 | CE04EW1H100M | CAP. ELECTRO | 10 | 20% | 50V |
| C111 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C112 | CE04EW1H100M | CAP. ELECTRO | 10 | 20% | 50V |
| C115 | CC45FSL1H151J | CAP. CERAMIC | 150P | 5% | 50V |
| C116 | CC45FCH1H560J | CAP. CERAMIC | 56P | 5% | 50V |
| C117 | CC45FCH1H820J | CAP. CERAMIC | 82P | 5% | 50V |
| C118 | CC45FCH1H820J | CAP. CERAMIC | 82P | 5% | 50V |
| C119 | CC45FCH1H050C | CAP. CERAMIC | 5P | 0.25P | 50V |
| C120 | CC45FCH1H050C | CAP. CERAMIC | 5P | 0.25P | 50V |
| C121 | CC45FCH1H101J | CAP. CERAMIC | 100P | 5% | 50V |
| C122 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C123 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C124 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C125 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C126 | CC45FCH1H470J | CAP. CERAMIC | 47P | 5% | 50V |
| C127 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C128 | CK45FB1H102K | CAP. CERAMIC | 1000P | 10% | 50V |
| C129 | CC45FCH1H270J | CAP. CERAMIC | 27P | 5% | 50V |
| C205 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C206 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C207 | CC45FSL1H681J | CAP. CERAMIC | 680P | 5% | 50V |
| C208 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C209 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C210 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C211 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C214 | CC45FCH1H070D | CAP. CERAMIC | 7P | 0.5P | 50V |
| C215 | NO USE | | | | |

| REF.NO | PARTS NO | NAME & DESCRIPTION | | | |
|---|---|---|---|---|---|
| C216 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C217 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C218 | CC45FCH1H150J | CAP. CERAMIC | 15P | 5% | 50V |
| C219 | CC45FCH1H0R5C | CAP. CERAMIC | 0.5P | 0.25P | 50V |
| C220 | CC45FCH1H0R5C | CAP. CERAMIC | 0.5P | 0.25P | 50V |
| C221 | C91-1269-05 | CAP. POLYESTER | 0.047 | 10% | 250V |
| C222 | C91-1269-05 | CAP. POLYESTER | 0.047 | 10% | 250V |
| C223 | C91-1268-05 | CAP. POLYESTER | 0.022 | 10% | 630V |
| C224 | C91-1268-05 | CAP. POLYESTER | 0.022 | 10% | 630V |
| C225 | NO USE | | | | |
| C226 | CQ92FM1H104K | CAP. MYLAR | 0.1 | 10% | 50V |
| C227 | CE04W2C010M | CAP. ELECTRO | 1 | 20% | 160V |
| C228 | CE04EW1E101M | CAP. ELECTRO | 100 | 20% | 25V |
| C229 | CE04EW1E101M | CAP. ELECTRO | 100 | 20% | 25V |
| C230 | CE04EW1H100M | CAP. ELECTRO | 10 | 20% | 50V |
| C231 | CE04EW1H100M | CAP. ELECTRO | 10 | 20% | 50V |
| C232 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C233 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C234 | CE04EW1H100M | CAP. ELECTRO | 10 | 20% | 50V |
| C235 | CE04EW1H100M | CAP. ELECTRO | 10 | 20% | 50V |
| C236 | CE04EW1H100M | CAP. ELECTRO | 10 | 20% | 50V |
| C237 | C91-1309-05 | CAP. CERAMIC | 0.01 | 10% | 500V |
| C238 | CQ92M1H104K | CAP. MYLAR | 0.1 | 10% | 50V |
| C239 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C301 | CE04EW1V102M | CAP. ELECTRO | 1000 | 20% | 35V |
| C302 | CE04EW1V222M | CAP. ELECTRO | 2200 | 20% | 35V |
| C303 | NO USE | | | | |
| C304 | CE04EW1H100M | CAP. ELECTRO | 10 | 20% | 50V |
| C305 | CE04W2E470M | CAP. ELECTRO | 47 | 20% | 250V |
| C306 | CE04W2E2R2M | CAP. ELECTRO | 2.2 | 20% | 250V |
| C307 | CE04W2C010M | CAP. ELECTRO | 1 | 20% | 160V |
| C308 | CQ92FM1H223K | CAP. MYLAR | 0.022 | 10% | 50V |
| C309 | CQ92FM1H223K | CAP. MYLAR | 0.022 | 10% | 50V |
| C351 | CQ92FM1H103J | CAP. MYLAR | 0.01 | 5% | 50V |
| C352 | CQ92FM1H103J | CAP. MYLAR | 0.01 | 5% | 50V |
| C353 | CC45FCH1H050C | CAP. CERAMIC | 5P | 0.25P | 50V |
| C354 | CK45FB1H102K | CAP. CERAMIC | 1000P | 10% | 50V |
| C355 | CE04EW1E470M | CAP. ELECTRO | 47 | 20% | 25V |
| C404 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C405 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C406 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C407 | NO USE | | | | |
| C408 | C91-0769-05 | CAP. CERAMIC | 0.01 | 20% | 16V |
| C409 | C91-0769-05 | CAP. CERAMIC | 0.01 | 20% | 16V |
| C410 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C411 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C412 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C413 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C451 | CE04EW1C222M | CAP. ELECTRO | 2200 | 20% | 16V |
| C452 | CE04EW1E470M | CAP. ELECTRO | 47 | 20% | 25V |
| C801 | CC45CH1H680J | CAP. CERAMIC | 68P | 5% | 50V |
| C802 | CQ92M1H102K | CAP. MYLAR | 1000P | 10% | 50V |
| C803 | CQ92M1H103K | CAP. MYLAR | 0.01 | 10% | 50V |
| C804 | CK45F1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C805 | NO USE | | | | |
| C806 | CQ92M1H104K | CAP. MYLAR | 0.1 | 10% | 50V |
| C807 | CE04EW1A331M | CAP. ELECTRO | 330 | 20% | 10V |
| D001 | 1S1588 | DIODE | | | |
| D002 | 1S1588 | DIODE | | | |
| D003 | 1S1588 | DIODE | | | |
| D004 | 1S1588 | DIODE | | | |
| D005 | 1SS132 | DIODE | | | |
| D006 | 1SS132 | DIODE | | | |
| D007 | 1SS132 | DIODE | | | |
| D101 | MA700 | DIODE | | | |
| D101 | 1S1588 | DIODE | | | |
| D102 | 1S1588 | DIODE | | | |
| D103 | 1S1588 | DIODE | | | |
| D104 | 1S1588 | DIODE | | | |
| D105 | 1SS132 | DIODE | | | |
| D106 | 1SS132 | DIODE | | | |
| D201 | 1SS132 | DIODE | | | |
| D202 | 1SS132 | DIODE | | | |
| D203 | 1SS132 | DIODE | | | |
| D204 | 1SS132 | DIODE | | | |
| D205 | MA700 | DIODE | | | |
| D206 | MA700 | DIODE | | | |
| D207 | HZ2(B3) | DIODE, ZENER | 2.2V | | |



# PARTS LIST

| REF.NO | PARTS NO | NAME & DESCRIPTION | | | |
|---|---|---|---|---|---|
| D208 | HZ2(B3) | DIODE, ZENER | 2.2V | | |
| D209 | 1S1588 | DIODE | | | |
| D210 | 1S1588 | DIODE | | | |
| D211 | 1S1588 | DIODE | | | |
| D212 | 1S1588 | DIODE | | | |
| D301 | 1G4B42 | DIODE | | | |
| D302 | HZS13J(B2) | DIODE, ZENER | 13.21V | | |
| D303 | HZS13J(B2) | DIODE, ZENER | 13.21V | | |
| D304 | 1SS132 | DIODE | | | |
| D305 | HZS5.6J(B2) | DIODE, ZENER | 5.62V | | |
| D306 | 1G4B42 | DIODE | | | |
| D307 | 1SS132 | DIODE | | | |
| D401 | MA700 | DIODE | | | |
| D402 | MA700 | DIODE | | | |
| D403 | MA700 | DIODE | | | |
| D404 | MA700 | DIODE | | | |
| D405 | MA700 | DIODE | | | |
| D406 | MA700 | DIODE | | | |
| D451 | 1G4B42 | DIODE | | | |
| JW071 | E31-5766-05 | WIRE ASS'Y(FOR 2SD1666) | | | |
| L201 | L40-2282-13 | AXIAL COIL | 0.22UH | | |
| L202 | L40-2282-13 | AXIAL COIL | 0.22UH | | |
| L401 | L40-1001-13 | FERRI INDUCTOR | 10UH | | |
| L402 | L40-1001-13 | FERRI INDUCTOR | 10UH | | |
| P001 | E40-0273-05 | PIN CONNECTOR | 2P | | |
| P002 | E40-0373-05 | PIN CONNECTOR | 3P | | |
| P003 | E40-0773-05 | PIN CONNECTOR | 7P | | |
| P004 | E40-0273-05 | PIN CONNECTOR | 2P | | |
| P005 | E40-0373-05 | PIN CONNECTOR | 3P | | |
| P006 | E40-0373-05 | PIN CONNECTOR | 3P | | |
| P007 | E40-0973-05 | PIN CONNECTOR | 9P | | |
| P008 | E23-0401-05 | PIN TERMINAL | | | |
| P009 | E23-0401-05 | PIN TERMINAL | | | |
| P010 | E40-0273-05 | PIN CONNECTOR | 2P | | |
| P011 | E40-3912-05 | PIN CONNECTOR | 5P | | |
| P012 | E40-0373-05 | PIN CONNECTOR | 3P | | |
| P013 | E40-0273-05 | PIN CONNECTOR | 2P | | |
| P014 | E40-0673-05 | PIN CONNECTOR | 6P | | |
| P015 | E40-0473-05 | PIN CONNECTOR | 4P | | |
| P016 | E40-0673-05 | PIN CONNECTOR | 6P | | |
| P017 | E40-0773-05 | PIN CONNECTOR | 7P | | |
| P018 | E40-0273-05 | PIN CONNECTOR | 2P | | |
| P019 | E40-0273-05 | PIN CONNECTOR | 2P | | |
| P020 | E40-4248-05 | PIN CONNECTOR | 2P | | |
| P021 | E40-0273-05 | PIN CONNECTOR | 2P | | |
| P035 | E40-0373-05 | PIN CONNECTOR | 3P | | |
| P057 | E40-0473-05 | PIN CONNECTOR | 4P | | |
| Q001 | 2SC1907 | TR. SI. NPN | | | |
| Q002 | 2SK304(E) | FET. N-CHANNEL | | | |
| Q003 | 2SC945(Q) | TR. SI. NPN | | | |
| Q004 | 2SA844(D) | TR. SI. PNP | | | |
| Q005 | 2SC945(Q) | TR. SI. NPN | | | |
| Q006 | 2SA1005(K) | TR. SI. PNP | | | |
| Q007 | 2SA1005(K) | TR. SI. PNP | | | |
| Q008 | 2SA838(B) | TR. SI. PNP | | | |
| Q009 | 2SA838(B) | TR. SI. PNP | | | |
| Q010 | 2SC945(Q) | TR. SI. NPN | | | |
| Q011 | 2SA1005(K) | TR. SI. PNP | | | |
| Q012 | 2SA1005(K) | TR. SI. PNP | | | |
| Q013 | 2SC1907 | TR. SI. NPN | | | |
| Q101 | 2SC1907 | TR. SI. NPN | | | |
| Q102 | 2SK304(E) | FET. N-CHANNEL | | | |
| Q103 | 2SC945(Q) | TR. SI. NPN | | | |
| Q104 | 2SA844(D) | TR. SI. PNP | | | |
| Q105 | 2SC945(Q) | TR. SI. NPN | | | |
| Q106 | 2SA1005(K) | TR. SI. PNP | | | |
| Q107 | 2SA1005(K) | TR. SI. PNP | | | |
| Q108 | 2SA838(B) | TR. SI. PNP | | | |
| Q109 | 2SA838(B) | TR. SI. PNP | | | |
| Q110 | 2SA838(B) | TR. SI. PNP | | | |
| Q111 | 2SA838(B) | TR. SI. PNP | | | |
| Q112 | 2SA1005(K) | TR. SI. PNP | | | |
| Q113 | 2SA1005(K) | TR. SI. PNP | | | |
| Q201 | 2SA1206(K) | TR. SI. PNP | | | |
| Q202 | 2SA1206(K) | TR. SI. PNP | | | |

| REF.NO | PARTS NO | NAME & DESCRIPTION | | | |
|---|---|---|---|---|---|
| Q203 | 2SC945(Q) | TR. SI. NPN | | | |
| Q204 | 2SA844(D) | TR. SI. PNP | | | |
| Q205 | 2SC1907 | TR. SI. NPN | | | |
| Q206 | 2SC1907 | TR. SI. NPN | | | |
| Q207 | 2SC1907 | TR. SI. NPN | | | |
| Q208 | 2SC1907 | TR. SI. NPN | | | |
| Q209 | 2SC1907 | TR. SI. NPN | | | |
| Q210 | 2SC1907 | TR. SI. NPN | | | |
| Q211 | 2SA1206(K) | TR. SI. PNP | | | |
| Q212 | 2SA1206(K) | TR. SI. PNP | | | |
| Q213 | 2SC2570A | TR. SI. NPN | | | |
| Q214 | 2SC2570A | TR. SI. NPN | | | |
| Q215 | 2SC3423(Y) | TR. SI. NPN | | | |
| Q216 | 2SC3423(Y) | TR. SI. NPN | | | |
| Q217 | 2SA1360(Y) | TR. SI. PNP | | | |
| Q218 | 2SA1360(Y) | TR. SI. PNP | | | |
| Q219 | 2SC2570A | TR. SI. NPN | | | |
| Q220 | 2SC2570A | TR. SI. NPN | | | |
| Q301 | 2SD880(Y) | TR. SI. NPN | | | |
| Q302 | 2SB834(Y) | TR. SI. PNP | | | |
| Q303 | 2SD880(Y) | TR. SI. NPN | | | |
| Q304 | 2SB861(C) | TR. SI. PNP | | | |
| Q401 | 2SC1907 | TR. SI. NPN | | | |
| Q402 | 2SC1907 | TR. SI. NPN | | | |
| Q403 | 2SA1005(K) | TR. SI. PNP | | | |
| Q404 | 2SA1005(K) | TR. SI. PNP | | | |
| Q801 | 2SD1666 | TR. SI. NPN | | | |
| R001 | RD14BB2C220J | RES. CARBON | 22 | 5% | 1/6W |
| R012 | RN14BK2E1004F | RES. METAL FILM | 1M | 1% | 1/4W |
| R013 | RD14BB2E824J | RES. CARBON | 820K | 5% | 1/4W |
| R014 | RD14BB2C102J | RES. CARBON | 1K | 5% | 1/6W |
| R015 | RD14BB2C102J | RES. CARBON | 1K | 5% | 1/6W |
| R016 | RD14BB2C101J | RES. CARBON | 100 | 5% | 1/6W |
| R017 | RD14BB2C680J | RES. CARBON | 680 | 5% | 1/6W |
| R018 | RD14BB2C392J | RES. CARBON | 3.9K | 5% | 1/6W |
| R019 | RD14BB2C822J | RES. CARBON | 8.2K | 5% | 1/6W |
| R020 | RD14BB2C562J | RES. CARBON | 5.6K | 5% | 1/6W |
| R021 | NO USE | | | | |
| R022 | RD14BB2C391J | RES. CARBON | 390 | 5% | 1/6W |
| R023 | RD14BB2C122J | RES. CARBON | 1.2K | 5% | 1/6W |
| R024 | RD14BB2C100J | RES. CARBON | 10 | 5% | 1/6W |
| R025 | RD14BB2C100J | RES. CARBON | 10 | 5% | 1/6W |
| R033 | RD14BB2C121J | RES. CARBON | 120 | 5% | 1/6W |
| R034 | RD14BB2C121J | RES. CARBON | 120 | 5% | 1/6W |
| R035 | RD14BB2C680J | RES. CARBON | 680 | 5% | 1/6W |
| R036 | RD14BB2C562J | RES. CARBON | 5.6K | 5% | 1/6W |
| R037 | RD14BB2C562J | RES. CARBON | 5.6K | 5% | 1/6W |
| R038 | RD14BB2C101J | RES. CARBON | 100 | 5% | 1/6W |
| R039 | RD14BB2C473J | RES. CARBON | 47K | 5% | 1/6W |
| R040 | RD14BB2C4R7J | RES. CARBON | 4.7 | 5% | 1/6W |
| R041 | RD14BB2C270J | RES. CARBON | 27 | 5% | 1/6W |
| R042 | RD14BB2C270J | RES. CARBON | 27 | 5% | 1/6W |
| R043 | RD14BB2C473J | RES. CARBON | 47K | 5% | 1/6W |
| R044 | RN14BK2C56R0F | RES. METAL FILM | 56.0 | 1% | 1/6W |
| R045 | RN14BK2C56R0F | RES. METAL FILM | 56.0 | 1% | 1/6W |
| R046 | RN14BK2C4700F | RES. METAL FILM | 470 | 1% | 1/6W |
| R047 | RN14BK2C4700F | RES. METAL FILM | 470 | 1% | 1/6W |
| R048 | RD14BB2C271J | RES. CARBON | 270 | 5% | 1/6W |
| R049 | RN14BK2C6800F | RES. METAL FILM | 680 | 1% | 1/6W |
| R050 | RN14BK2C6800F | RES. METAL FILM | 680 | 1% | 1/6W |
| R051 | RD14BB2C220J | RES. CARBON | 22 | 5% | 1/6W |
| R052 | RD14BB2C220J | RES. CARBON | 22 | 5% | 1/6W |
| R053 | RD14BB2C121J | RES. CARBON | 120 | 5% | 1/6W |
| R054 | RD14BB2C122J | RES. CARBON | 1.2K | 5% | 1/6W |
| R055 | RD14BB2C122J | RES. CARBON | 1.2K | 5% | 1/6W |
| R056 | RD14BB2C181J | RES. CARBON | 180 | 5% | 1/6W |
| R057 | RD14BB2C181J | RES. CARBON | 180 | 5% | 1/6W |
| R058 | RD14BB2C101J | RES. CARBON | 100 | 5% | 1/6W |
| R059 | RD14BB2C622J | RES. CARBON | 6.2K | 5% | 1/6W |
| R060 | RD14BB2C622J | RES. CARBON | 6.2K | 5% | 1/6W |
| R061 | RD14BB2C470J | RES. CARBON | 47 | 5% | 1/6W |
| R062 | RD14BB2C470J | RES. CARBON | 47 | 5% | 1/6W |
| R063 | RD14BB2C221J | RES. CARBON | 220 | 5% | 1/6W |
| R064 | RD14BB2C561J | RES. CARBON | 560 | 5% | 1/6W |
| R065 | RD14BB2C332J | RES. CARBON | 3.3K | 5% | 1/6W |
| R066 | RD14BB2C682J | RES. CARBON | 6.8K | 5% | 1/6W |
| R067 | RD14BB2C151J | RES. CARBON | 150 | 5% | 1/6W |
| R068 | RD14BB2C151J | RES. CARBON | 150 | 5% | 1/6W |
| R069 | RD14BB2C820J | RES. CARBON | 82 | 5% | 1/6W |
| R070 | RN14BK2C1001F | RES. METAL FILM | 1K | 1% | 1/6W |
| R071 | RN14BK2C1001F | RES. METAL FILM | 1K | 1% | 1/6W |

# PARTS LIST

| REF.NO | PARTS NO | NAME & DESCRIPTION | | | |
|---|---|---|---|---|---|
| R072 | RD14BB2C221J | RES. CARBON | 220 | 5% | 1/6W |
| R073 | RD14BB2C472J | RES. CARBON | 4.7K | 5% | 1/6W |
| R074 | RD14BB2C102J | RES. CARBON | 1K | 5% | 1/6W |
| R075 | RD14BB2C101J | RES. CARBON | 100 | 5% | 1/6W |
| R076 | RD14BB2C152J | RES. CARBON | 1.5K | 5% | 1/6W |
| R077 | RD14BB2C100J | RES. CARBON | 10 | 5% | 1/6W |
| R078 | RD14BB2C390J | RES. CARBON | 39 | 5% | 1/6W |
| R101 | RD14BB2C220J | RES. CARBON | 22 | 5% | 1/6W |
| R112 | RN14BK2E1004F | RES. METAL FILM | 1M | 1% | 1/4W |
| R113 | RD14BB2E824J | RES. CARBON | 820K | 5% | 1/4W |
| R114 | RD14BB2E102J | RES. CARBON | 1K | 5% | 1/4W |
| R115 | RD14BB2C102J | RES. CARBON | 1K | 5% | 1/6W |
| R116 | RD14BB2C101J | RES. CARBON | 100 | 5% | 1/6W |
| R117 | RD14BB2C681J | RES. CARBON | 680 | 5% | 1/6W |
| R118 | RD14BB2C392J | RES. CARBON | 3.9K | 5% | 1/6W |
| R119 | RD14BB2C822J | RES. CARBON | 8.2K | 5% | 1/6W |
| R120 | RD14BB2C562J | RES. CARBON | 5.6K | 5% | 1/6W |
| R121 | NO USE | | | | |
| R122 | RD14BB2C391J | RES. CARBON | 390 | 5% | 1/6W |
| R123 | RD14BB2C122J | RES. CARBON | 1.2K | 5% | 1/6W |
| R124 | RD14BB2C100J | RES. CARBON | 10 | 5% | 1/6W |
| R125 | RD14BB2C100J | RES. CARBON | 10 | 5% | 1/6W |
| R133 | RD14BB2C121J | RES. CARBON | 120 | 5% | 1/6W |
| R134 | RD14BB2C121J | RES. CARBON | 120 | 5% | 1/6W |
| R135 | RD14BB2C681J | RES. CARBON | 680 | 5% | 1/6W |
| R136 | RD14BB2C562J | RES. CARBON | 5.6K | 5% | 1/6W |
| R137 | RD14BB2C562J | RES. CARBON | 5.6K | 5% | 1/6W |
| R138 | RD14BB2C101J | RES. CARBON | 100 | 5% | 1/6W |
| R139 | RD14BB2C473J | RES. CARBON | 47K | 5% | 1/6W |
| R140 | RD14BB2C4R7J | RES. CARBON | 4.7 | 5% | 1/6W |
| R141 | RD14BB2C270J | RES. CARBON | 27 | 5% | 1/6W |
| R142 | RD14BB2C270J | RES. CARBON | 27 | 5% | 1/6W |
| R143 | RD14BB2C473J | RES. CARBON | 47K | 5% | 1/6W |
| R144 | RN14BK2C56R0F | RES. METAL FILM | 56.0 | 1% | 1/6W |
| R145 | RN14BK2C56R0F | RES. METAL FILM | 56.0 | 1% | 1/6W |
| R146 | RN14BK2C4700F | RES. METAL FILM | 470 | 1% | 1/6W |
| R147 | RN14BK2C4700F | RES. METAL FILM | 470 | 1% | 1/6W |
| R148 | RD14BB2C271J | RES. CARBON | 270 | 5% | 1/6W |
| R149 | RN14BK2C6800F | RES. METAL FILM | 680 | 1% | 1/6W |
| R150 | RN14BK2C6800F | RES. METAL FILM | 680 | 1% | 1/6W |
| R151 | RD14BB2C220J | RES. CARBON | 22 | 5% | 1/6W |
| R152 | RD14BB2C220J | RES. CARBON | 22 | 5% | 1/6W |
| R153 | RD14BB2C121J | RES. CARBON | 120 | 5% | 1/6W |
| R154 | RD14BB2C122J | RES. CARBON | 1.2K | 5% | 1/6W |
| R155 | RD14BB2C122J | RES. CARBON | 1.2K | 5% | 1/6W |
| R156 | RD14BB2C181J | RES. CARBON | 180 | 5% | 1/6W |
| R157 | RD14BB2C181J | RES. CARBON | 180 | 5% | 1/6W |
| R158 | RD14BB2C101J | RES. CARBON | 100 | 5% | 1/6W |
| R159 | RD14BB2C622J | RES. CARBON | 6.2K | 5% | 1/6W |
| R160 | RD14BB2C622J | RES. CARBON | 6.2K | 5% | 1/6W |
| R161 | RD14BB2C470J | RES. CARBON | 47 | 5% | 1/6W |
| R162 | RD14BB2C470J | RES. CARBON | 47 | 5% | 1/6W |
| R163 | RD14BB2C470J | RES. CARBON | 47 | 5% | 1/6W |
| R164 | RD14BB2C470J | RES. CARBON | 47 | 5% | 1/6W |
| R165 | RD14BB2C122J | RES. CARBON | 1.2K | 5% | 1/6W |
| R166 | RD14BB2C221J | RES. CARBON | 220 | 5% | 1/6W |
| R167 | RD14BB2C221J | RES. CARBON | 220 | 5% | 1/6W |
| R168 | RD14BB2C151J | RES. CARBON | 150 | 5% | 1/6W |
| R169 | RD14BB2C151J | RES. CARBON | 150 | 5% | 1/6W |
| R170 | RD14BB2C820J | RES. CARBON | 82 | 5% | 1/6W |
| R171 | RN14BK2C1001F | RES. METAL FILM | 1K | 1% | 1/6W |
| R172 | RN14BK2C1001F | RES. METAL FILM | 1K | 1% | 1/6W |
| R173 | RD14BB2C221J | RES. CARBON | 220 | 5% | 1/6W |
| R174 | RD14BB2C221J | RES. CARBON | 220 | 5% | 1/6W |
| R201 | RD14BB2C221J | RES. CARBON | 220 | 5% | 1/6W |
| R202 | RD14BB2C221J | RES. CARBON | 220 | 5% | 1/6W |
| R203 | RN14BK2C4700F | RES. METAL FILM | 470 | 1% | 1/6W |
| R204 | RN14BK2C4700F | RES. METAL FILM | 470 | 1% | 1/6W |
| R205 | RD14BB2C682J | RES. CARBON | 6.8K | 5% | 1/6W |
| R206 | RD14BB2C682J | RES. CARBON | 6.8K | 5% | 1/6W |
| R207 | RD14BB2C122J | RES. CARBON | 1.2K | 5% | 1/6W |
| R208 | RD14BB2C122J | RES. CARBON | 1.2K | 5% | 1/6W |
| R209 | RD14BB2C820J | RES. CARBON | 82 | 5% | 1/6W |
| R210 | RD14BB2C820J | RES. CARBON | 82 | 5% | 1/6W |
| R211 | RD14BB2C681J | RES. CARBON | 680 | 5% | 1/6W |
| R212 | RD14BB2C103J | RES. CARBON | 10K | 5% | 1/6W |
| R213 | RD14BB2C103J | RES. CARBON | 10K | 5% | 1/6W |
| R214 | RD14BB2C103J | RES. CARBON | 10K | 5% | 1/6W |
| R215 | RD14BB2C103J | RES. CARBON | 10K | 5% | 1/6W |
| R216 | R90-0645-05 | RES. NETWORK | 4X10K | 5% | |
| R217 | RD14BB2C102J | RES. CARBON | 1K | 5% | 1/6W |
| R218 | RD14BB2C103J | RES. CARBON | 10K | 5% | 1/6W |

| REF.NO | PARTS NO | NAME & DESCRIPTION | | | |
|---|---|---|---|---|---|
| R219 | RD14BB2C102J | RES. CARBON | 1K | 5% | 1/6W |
| R220 | RD14BB2C102J | RES. CARBON | 1K | 5% | 1/6W |
| R221 | RN14BK2C91R0F | RES. METAL FILM | 91.0 | 1% | 1/6W |
| R222 | RN14BK2C91R0F | RES. METAL FILM | 91.0 | 1% | 1/6W |
| R223 | RD14BB2C470J | RES. CARBON | 47 | 5% | 1/6W |
| R224 | RD14BB2C470J | RES. CARBON | 47 | 5% | 1/6W |
| R225 | RD14BB2C201J | RES. CARBON | 200 | 5% | 1/6W |
| R226 | RD14BB2C102J | RES. CARBON | 1K | 5% | 1/6W |
| R227 | RD14BB2C102J | RES. CARBON | 1K | 5% | 1/6W |
| R228 | RD14BB2C122J | RES. CARBON | 1.2K | 5% | 1/6W |
| R229 | RD14BB2C104J | RES. CARBON | 100K | 5% | 1/6W |
| R230 | RD14BB2C104J | RES. CARBON | 100K | 5% | 1/6W |
| R231 | RD14BB2C470J | RES. CARBON | 47 | 5% | 1/6W |
| R232 | RD14BB2C470J | RES. CARBON | 47 | 5% | 1/6W |
| R233 | RD14BB2C562J | RES. CARBON | 5.6K | 5% | 1/6W |
| R234 | RD14BB2C682J | RES. CARBON | 6.8K | 5% | 1/6W |
| R235 | RD14BB2C102J | RES. CARBON | 1K | 5% | 1/6W |
| R236 | RD14BB2C102J | RES. CARBON | 1K | 5% | 1/6W |
| R237 | RD14BB2C470J | RES. CARBON | 47 | 5% | 1/6W |
| R238 | RD14BB2C470J | RES. CARBON | 47 | 5% | 1/6W |
| R239 | RD14BB2C152J | RES. CARBON | 1.5K | 5% | 1/6W |
| R240 | RD14BB2C152J | RES. CARBON | 1.5K | 5% | 1/6W |
| R241 | RD14BB2C202J | RES. CARBON | 2K | 5% | 1/6W |
| R242 | RD14BB2C202J | RES. CARBON | 2K | 5% | 1/6W |
| R243 | RD14BB2C102J | RES. CARBON | 1K | 5% | 1/6W |
| R244 | RD14BB2C102J | RES. CARBON | 1K | 5% | 1/6W |
| R245 | RD14BB2C220J | RES. CARBON | 22 | 5% | 1/6W |
| R246 | RD14BB2C220J | RES. CARBON | 22 | 5% | 1/6W |
| R249 | RD14BB2C103J | RES. CARBON | 10K | 5% | 1/6W |
| R250 | RD14BB2C220J | RES. CARBON | 22 | 5% | 1/6W |
| R251 | RD14BB2C220J | RES. CARBON | 22 | 5% | 1/6W |
| R252 | RS14GB3A333J | RES. METAL FILM | 33K | 5% | 1W |
| R253 | RS14GB3A333J | RES. METAL FILM | 33K | 5% | 1W |
| R254 | RD14BB2C820J | RES. CARBON | 82 | 5% | 1/6W |
| R255 | RD14BB2C820J | RES. CARBON | 82 | 5% | 1/6W |
| R256 | RD14DB2H473J | RES. CARBON | 47K | 5% | 1/2W |
| R257 | RD14DB2H473J | RES. CARBON | 47K | 5% | 1/2W |
| R258 | RD14BB2C4R7J | RES. CARBON | 4.7 | 5% | 1/6W |
| R259 | RD14BB2C4R7J | RES. CARBON | 4.7 | 5% | 1/6W |
| R260 | RD14BB2C511J | RES. CARBON | 510 | 5% | 1/6W |
| R261 | RD14BB2C511J | RES. CARBON | 510 | 5% | 1/6W |
| R262 | RD14BB2C332J | RES. CARBON | 3.3K | 5% | 1/6W |
| R263 | RD14BB2C332J | RES. CARBON | 3.3K | 5% | 1/6W |
| R264 | RD14BB2C4R7J | RES. CARBON | 4.7 | 5% | 1/6W |
| R265 | RD14BB2C4R7J | RES. CARBON | 4.7 | 5% | 1/6W |
| R266 | RD14BB2C331J | RES. CARBON | 330 | 5% | 1/6W |
| R267 | RD14BB2C100J | RES. CARBON | 10 | 5% | 1/6W |
| R268 | RD14BB2C100J | RES. CARBON | 10 | 5% | 1/6W |
| R269 | RD14BB2C100J | RES. CARBON | 10 | 5% | 1/6W |
| R270 | RD14BB2C100J | RES. CARBON | 10 | 5% | 1/6W |
| R271 | RD14BB2C100J | RES. CARBON | 10 | 5% | 1/6W |
| R272 | RD14BB2C100J | RES. CARBON | 10 | 5% | 1/6W |
| R273 | RD14BB2C100J | RES. CARBON | 10 | 5% | 1/6W |
| R274 | RD14BB2C100J | RES. CARBON | 10 | 5% | 1/6W |
| R275 | RD14BB2C100J | RES. CARBON | 10 | 5% | 1/6W |
| R301 | RD14DB2H2R2J | RES. CARBON | 2.2 | 5% | 1/2W |
| R302 | RD14BB2C101J | RES. CARBON | 100 | 5% | 1/6W |
| R303 | RS14GB3A101J | RES. METAL FILM | 100 | 5% | 1W |
| R304 | RN14BK2C1202F | RES. METAL FILM | 12K | 1% | 1/6W |
| R305 | RN14BK2C1202F | RES. METAL FILM | 12K | 1% | 1/6W |
| R306 | RS14GB3A1R0J | RES. METAL FILM | 1 | 5% | 1W |
| R307 | RD14BB2C101J | RES. CARBON | 100 | 5% | 1/6W |
| R308 | RS14GB3A101J | RES. METAL FILM | 100 | 5% | 1W |
| R309 | RD14BB2C562J | RES. CARBON | 5.6K | 5% | 1/6W |
| R310 | RD14BB2C562J | RES. CARBON | 5.6K | 5% | 1/6W |
| R311 | RD14BB2C562J | RES. CARBON | 5.6K | 5% | 1/6W |
| R312 | RS14GB3A330J | RES. METAL FILM | 33 | 5% | 1W |
| R313 | RD14BB2C151J | RES. CARBON | 150 | 5% | 1/6W |
| R314 | RN14BK2C3901F | RES. METAL FILM | 3.9K | 1% | 1/6W |
| R315 | RN14BK2C9101F | RES. METAL FILM | 9.1K | 1% | 1/6W |
| R316 | RS14GB3D272J | RES. METAL FILM | 2.7K | 5% | 2W |
| R317 | RS14GB3D272J | RES. METAL FILM | 2.7K | 5% | 2W |
| R318 | RD14BB2C100J | RES. CARBON | 10 | 5% | 1/6W |
| R319 | RD14BB2C101J | RES. CARBON | 100 | 5% | 1/6W |
| R320 | RD14BB2C221J | RES. CARBON | 220 | 5% | 1/6W |
| R321 | RN14BK2C1203F | RES. METAL FILM | 120K | 1% | 1/6W |
| R322 | RN14BK2C1002F | RES. METAL FILM | 10K | 1% | 1/6W |
| R323 | RD14BB2C561J | RES. CARBON | 560 | 5% | 1/6W |
| R324 | RD14BB2E225J | RES. CARBON | 2.2M | 5% | 1/4W |
| R325 | RD14BB2E225J | RES. CARBON | 2.2M | 5% | 1/4W |
| R351 | RD14BB2C154J | RES. CARBON | 150K | 5% | 1/6W |
| R352 | RD14BB2C103J | RES. CARBON | 10K | 5% | 1/6W |
| R353 | RD14BB2C103J | RES. CARBON | 10K | 5% | 1/6W |

# PARTS LIST

| REF.NO | PARTS NO | NAME & DESCRIPTION | | | |
|---|---|---|---|---|---|
| R354 | RD14BB2C104J | RES. CARBON | 100K | 5% | 1/6W |
| R355 | RD14BB2C104J | RES. CARBON | 100K | 5% | 1/6W |
| R356 | RD14BB2C224J | RES. CARBON | 220K | 5% | 1/6W |
| R357 | RD14BB2C474J | RES. CARBON | 470K | 5% | 1/6W |
| R358 | RD14BB2C474J | RES. CARBON | 470K | 5% | 1/6W |
| R359 | RD14BB2C471J | RES. CARBON | 470 | 5% | 1/6W |
| R360 | RN14BK2C1102F | RES. METAL FILM | 11K | 1% | 1/6W |
| R361 | RN14BK2C7500F | RES. METAL FILM | 750 | 1% | 1/6W |
| R362 | NO USE | | | | |
| R363 | RD14BB2C100J | RES. CARBON | 10 | 5% | 1/6W |
| R405 | RD14BB2C103J | RES. CARBON | 10K | 5% | 1/6W |
| R406 | RD14BB2C332J | RES. CARBON | 3.3K | 5% | 1/6W |
| R407 | RD14BB2C102J | RES. CARBON | 1K | 5% | 1/6W |
| R408 | NO USE | | | | |
| R409 | RN14BK2C1201F | RES. METAL FILM | 1.2K | 1% | 1/6W |
| R410 | RN14BK2C1201F | RES. METAL FILM | 1.2K | 1% | 1/6W |
| R411 | RN14BK2C1151F | RES. METAL FILM | 1.15K | 1% | 1/6W |
| R412 | RD14BB2C111J | RES. CARBON | 110 | 5% | 1/6W |
| R413 | RD14BB2C912J | RES. CARBON | 9.1K | 5% | 1/6W |
| R414 | NO USE | | | | |
| R415 | RD14BB2C751J | RES. CARBON | 750 | 5% | 1/6W |
| R416 | RD14BB2C104J | RES. CARBON | 100K | 5% | 1/6W |
| R417 | RD14BB2C104J | RES. CARBON | 100K | 5% | 1/6W |
| R418 | RN14BK2C8201F | RES. METAL FILM | 8.2K | 1% | 1/6W |
| R419 | RN14BK2C2201F | RES. METAL FILM | 2.2K | 1% | 1/6W |
| R420 | RN14BK2C8200F | RES. METAL FILM | 820 | 1% | 1/6W |
| R421 | RD14BB2C472J | RES. CARBON | 4.7K | 5% | 1/6W |
| R422 | RD14BB2C103J | RES. CARBON | 10K | 5% | 1/6W |
| R423 | RD14BB2C472J | RES. CARBON | 4.7K | 5% | 1/6W |
| R424 | RD14BB2C472J | RES. CARBON | 4.7K | 5% | 1/6W |
| R425 | RD14BB2C472J | RES. CARBON | 4.7K | 5% | 1/6W |
| R426 | RD14BB2C472J | RES. CARBON | 4.7K | 5% | 1/6W |
| R427 | RD14BB2C104J | RES. CARBON | 100K | 5% | 1/6W |
| R428 | RD14BB2C104J | RES. CARBON | 100K | 5% | 1/6W |
| R429 | RD14BB2C104J | RES. CARBON | 100K | 5% | 1/6W |
| R430 | RD14BB2C104J | RES. CARBON | 100K | 5% | 1/6W |
| R431 | RD14BB2C104J | RES. CARBON | 100K | 5% | 1/6W |
| R432 | RD14BB2C104J | RES. CARBON | 100K | 5% | 1/6W |
| R433 | RD14BB2C104J | RES. CARBON | 100K | 5% | 1/6W |
| R434 | RD14BB2C104J | RES. CARBON | 100K | 5% | 1/6W |
| R435 | RD14BB2C104J | RES. CARBON | 100K | 5% | 1/6W |
| R436 | RD14BB2C104J | RES. CARBON | 100K | 5% | 1/6W |
| R437 | RD14BB2C104J | RES. CARBON | 100K | 5% | 1/6W |
| R438 | RD14BB2C104J | RES. CARBON | 100K | 5% | 1/6W |
| R439 | RD14BB2C104J | RES. CARBON | 100K | 5% | 1/6W |
| R801 | RD14BB2C2R2J | RES. CARBON | 2.2 | 5% | 1/6W |
| R802 | RD14BB2C752J | RES. CARBON | 7.5K | 5% | 1/6W |
| R803 | RD14BB2C134J | RES. CARBON | 130K | 5% | 1/6W |
| R804 | RD14BB2C154J | RES. CARBON | 150K | 5% | 1/6W |
| R805 | RD14BB2C132J | RES. CARBON | 1.3K | 5% | 1/6W |
| R806 | RD14BB2C163J | RES. CARBON | 16K | 5% | 1/6W |
| R807 | RD14BB2C271J | RES. CARBON | 270 | 5% | 1/6W |
| S001 | S32-2012-05 | LEVER SWITCH 2-3 | | | |
| S002 | S02-4510-05 | ROTARY SWITCH | | | |
| S101 | S32-2012-05 | LEVER SWITCH 2-3 | | | |
| S102 | S02-4510-05 | ROTARY SWITCH | | | |
| S201 | S32-4008-05 | LEVER SWITCH 4-5 | | | |
| TC005 | C05-0455-05 | CAP. TRIMMER | 30PF | | |
| TC006 | C05-0456-05 | CAP. TRIMMER | 60PF | | |
| TC105 | C05-0455-05 | CAP. TRIMMER | 30PF | | |
| TC106 | C05-0456-05 | CAP. TRIMMER | 60PF | | |
| TC201 | C05-0454-05 | CAP. TRIMMER | 20PF | | |
| TC202 | C05-0454-05 | CAP. TRIMMER | 20PF | | |
| TC203 | C05-0455-05 | CAP. TRIMMER | 30PF | | |
| TC901 | C05-0371-05 | CAP. TRIMMER | 10P | | |
| TH021 | 112-251-2 | THERMISTOR | | | |
| TH121 | 112-251-2 | THERMISTOR | | | |
| U001 | LF411CN | IC.DUAL JFET INPUT OP AMP | | | |
| U002 | CA3086 | IC. NPN TRANSISTOR ARRAY | | | |
| U101 | LF411CN | IC.DUAL JFET INPUT OP AMP | | | |
| U102 | CA3086 | IC. NPN TRANSISTOR ARRAY | | | |

| REF.NO | PARTS NO | NAME & DESCRIPTION |
|---|---|---|
| U201 | SN74LS47N | IC. DECODER/DRIVER |
| U202 | SN74LS00N | IC. QUAD 2 INPUT NAND |
| U203 | SN74LS00N | IC. QUAD 2 INPUT NAND |
| U204 | SN74LS112AN | IC. DUAL JK-FF |
| U205 | SN74LS00N | IC. QUAD 2 INPUT NAND |
| U301 | UPC4558C | IC. OP AMP |
| U302 | UPC4558C | IC. OP AMP |
| U351 | TC4011BP | IC. QUAD 2-INPUT NAND GATE |
| U451 | TA78005AP | IC. 3-TERMINAL REGULATOR |
| VR001 | R12-3550-05 | RES. SEMI FIXED 20K B |
| VR002 | R12-0577-05 | RES. SEMI FIXED 500 B |
| VR003 | R12-3550-05 | RES. SEMI FIXED 20K B |
| VR004 | R12-0575-05 | RES. SEMI FIXED 100 B |
| VR005 | NO USE | |
| VR006 | R12-3550-05 | RES. SEMI FIXED 20K B |
| VR007 | R12-0577-05 | RES. SEMI FIXED 500 B |
| VR008 | R12-0577-05 | RES. SEMI FIXED 500 B |
| VR009 | R12-1545-05 | RES. SEMI FIXED 1K B |
| VR010 | NO USE | |
| VR011 | R12-1545-05 | RES. SEMI FIXED 1K B |
| VR101 | R12-3550-05 | RES. SEMI FIXED 20K B |
| VR102 | R12-0577-05 | RES. SEMI FIXED 500 B |
| VR103 | R12-3550-05 | RES. SEMI FIXED 20K B |
| VR104 | R12-0575-05 | RES. SEMI FIXED 100 B |
| VR105 | NO USE | |
| VR106 | R12-3550-05 | RES. SEMI FIXED 20K B |
| VR107 | R12-0577-05 | RES. SEMI FIXED 500 B |
| VR108 | R12-0577-05 | RES. SEMI FIXED 500 B |
| VR109 | R12-1545-05 | RES. SEMI FIXED 1K B |
| VR110 | NO USE | |
| VR111 | R12-1545-05 | RES. SEMI FIXED 1K B |
| VR201 | R12-0577-05 | RES. SEMI FIXED 500 B |
| VR202 | R12-0576-05 | RES. SEMI FIXED 200 B |
| VR203 | R12-0577-05 | RES. SEMI FIXED 500 B |
| VR204 | R12-0576-05 | RES. SEMI FIXED 200 B |
| VR205 | R12-1546-05 | RES. SEMI FIXED 2K B |
| VR301 | R12-1545-05 | RES. SEMI FIXED 1K B |
| VR351 | R12-0577-05 | RES. SEMI FIXED 500 B |
| VR401 | R12-1545-05 | RES. SEMI FIXED 1K B |
| VR402 | R12-1546-05 | RES. SEMI FIXED 2K B |

# PARTS LIST

## HORIZONTAL UNIT

## X74-1490-01

| REF.NO | PARTS NO | NAME & DESCRIPTION | | | |
|---|---|---|---|---|---|
| | F01-0867-05 | HEAT SINK | | | |
| | F11-1208-13 | SHIELD CASE | | | |
| | F15-0727-04 | HOLDER (NEON LAMP) | | | |
| | F20-0516-05 | INSULATOR | | | |
| | F20-0675-04 | INSULATED SHEET | | | |
| | J25-5259-12 | PCB (UNMOUNTED) | | | |
| | J25-5268-04 | PCB (UNMOUNTED) 86X46 | | | |
| | J42-0538-04 | BUSHING | | | |
| | J61-0501-05 | BOARD SUPPORT | | | |
| | N19-0191-05 | WASHER NONMETAL | | | |
| | N30-3006-41 | SCREW, PAN HD | M3X6 | | |
| | R92-0150-05 | JUMPING RES. | ZERO OHM(10MM) | | |
| | R92-1061-05 | JUMPING RES. | ZERO OHM (5MM) | | |
| C002 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C003 | CE04EW1H100M | CAP. ELECTRO | 10 | 20% | 50V |
| C004 | CQ92FM1H223K | CAP. MYLAR | 0.022 | 10% | 50V |
| C005 | CC45FCH1H221J | CAP. CERAMIC | 220P | 5% | 50V |
| C006 | CC45FCH1H470J | CAP. CERAMIC | 47P | 5% | 50V |
| C007 | CC45CH1H101J | CAP. CERAMIC | 100P | 5% | 50V |
| C008 | CC45FSL1H271J | CAP. CERAMIC | 270P | 5% | 50V |
| C009 | CE04EW1H100M | CAP. ELECTRO | 10 | 20% | 50V |
| C010 | CE04EW1E470M | CAP. ELECTRO | 47 | 20% | 25V |
| C011 | CE04EW1E470M | CAP. ELECTRO | 47 | 20% | 25V |
| C012 | CE04EW1H100M | CAP. ELECTRO | 10 | 20% | 50V |
| C013 | CS15E1V010M | CAP. TANTALUM | 1 | 20% | 35V |
| C014 | CC45FCH1H030C | CAP. CERAMIC | 3P | 0.25P | 50V |
| C015 | CQ92FM1H103K | CAP. MYLAR | 0.01 | 10% | 50V |
| C016 | CC45FCH1H470J | CAP. CERAMIC | 47P | 5% | 50V |
| C017 | CE04EW1E470M | CAP. ELECTRO | 47 | 20% | 25V |
| C018 | CE04EW1H100M | CAP. ELECTRO | 10 | 20% | 50V |
| C019 | CE04EW1H100M | CAP. ELECTRO | 10 | 20% | 50V |
| C020 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C021 | CC45FCH1H101J | CAP. CERAMIC | 100P | 5% | 50V |
| C022 | CE04EW1H100M | CAP. ELECTRO | 10 | 20% | 50V |
| C023 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C101 | CC45FSL1H561J | CAP. CERAMIC | 560P | 5% | 50V |
| C102 | NO USE | | | | |
| C103 | CQ92FM1H104K | CAP. MYLAR | 0.1 | 10% | 50V |
| C104 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C105 | CE04EW1H100M | CAP. ELECTRO | 10 | 20% | 50V |
| C106 | CE04EW1H100M | CAP. ELECTRO | 10 | 20% | 50V |
| C107 | CC45FCH1H820J | CAP. CERAMIC | 82P | 5% | 50V |
| C108 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C109 | C91-0574-05 | CAP. MYLAR | 1 | 5% | 100V |
| C110 | NO USE | | | | |
| C111 | CC45FCH1H050C | CAP. CERAMIC | 5P | 0.25P | 50V |
| C112 | CE04EW1H100M | CAP. ELECTRO | 10 | 20% | 50V |
| C113 | CC45FCH1H221J | CAP. CERAMIC | 220P | 5% | 50V |
| C114 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C115 | CE04EW1E470M | CAP. ELECTRO | 47 | 20% | 25V |
| C116 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C117 | CQ92FM1H473K | CAP. MYLAR | 0.047 | 10% | 50V |
| C118 | CC45FCH1H100D | CAP. CERAMIC | 10P | 0.5P | 50V |
| C119 | CC45FCH1H470J | CAP. CERAMIC | 47P | 5% | 50V |
| C120 | CQ92FM1H104K | CAP. MYLAR | 0.1 | 10% | 50V |
| C121 | CK45FB1H102K | CAP. CERAMIC | 1000P | 10% | 50V |
| C122 | CE04EW1H100M | CAP. ELECTRO | 10 | 20% | 50V |
| C123 | CE04EW1H100M | CAP. ELECTRO | 10 | 20% | 50V |
| C124 | CE04EW1H100M | CAP. ELECTRO | 10 | 20% | 50V |
| C125 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C126 | CE04EW1H100M | CAP. ELECTRO | 10 | 20% | 50V |
| C127 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C128 | CE04EW1H100M | CAP. ELECTRO | 10 | 20% | 50V |
| C201 | CC45FSL1H561J | CAP. CERAMIC | 560P | 5% | 50V |
| C202 | CE04EW1H100M | CAP. ELECTRO | 10 | 20% | 50V |
| C203 | CQ92FM1H104K | CAP. MYLAR | 0.1 | 10% | 50V |
| C204 | CE04EW1H100M | CAP. ELECTRO | 10 | 20% | 50V |
| C205 | CE04EW1H100M | CAP. ELECTRO | 10 | 20% | 50V |
| C206 | CE04EW1H100M | CAP. ELECTRO | 10 | 20% | 50V |
| C207 | CC45FCH1H820J | CAP. CERAMIC | 82P | 5% | 50V |
| C208 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C209 | C91-0574-05 | CAP. MYLAR | 1 | 5% | 100V |
| C210 | NO USE | | | | |
| C211 | CC45FCH1H050C | CAP. CERAMIC | 5P | 0.25P | 50V |
| C212 | CE04EW1E101M | CAP. ELECTRO | 100 | 20% | 25V |
| C213 | CC45FCH1H050C | CAP. CERAMIC | 5P | 0.25P | 50V |
| C214 | CC45FCH1H100D | CAP. CERAMIC | 10P | 0.5P | 50V |
| C215 | NO USE | | | | |
| C216 | CE04BW1E100M | CAP. ELECTRO | 10 | 20% | 25V |
| C217 | CC45FCH1H470J | CAP. CERAMIC | 47P | 5% | 50V |
| C218 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C219 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C220 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C221 | CC45FCH1H151J | CAP. CERAMIC | 150P | 5% | 50V |
| C222 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C223 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C224 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C225 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C226 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C227 | CE04EW1H100M | CAP. ELECTRO | 10 | 20% | 50V |
| C228 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C229 | NO USE | | | | |
| C230 | CE04EW1H100M | CAP. ELECTRO | 10 | 20% | 50V |
| C231 | CE04EW1H100M | CAP. ELECTRO | 10 | 20% | 50V |
| C301 | CC45FCH1H820J | CAP. CERAMIC | 82P | 5% | 50V |
| C302 | CC45FSL1H471J | CAP. CERAMIC | 470P | 5% | 50V |
| C303 | C91-1309-05 | CAP. CERAMIC | 0.01 | 10% | 500V |
| C304 | C91-1309-05 | CAP. CERAMIC | 0.01 | 10% | 500V |
| C305 | C91-1309-05 | CAP. CERAMIC | 0.01 | 10% | 500V |
| C306 | CE04EW1H100M | CAP. ELECTRO | 10 | 20% | 50V |
| C307 | C91-1309-05 | CAP. CERAMIC | 0.01 | 10% | 500V |
| C308 | C91-1309-05 | CAP. CERAMIC | 0.01 | 10% | 500V |
| C401 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C402 | CC45FCH1H221J | CAP. CERAMIC | 220P | 5% | 50V |
| C403 | CE04EW1H100M | CAP. ELECTRO | 10 | 20% | 50V |
| C404 | CE04EW1H100M | CAP. ELECTRO | 10 | 20% | 50V |
| C405 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C406 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C407 | C91-1309-05 | CAP. CERAMIC | 0.01 | 10% | 500V |
| C408 | C91-1309-05 | CAP. CERAMIC | 0.01 | 10% | 500V |
| C409 | C91-1266-05 | CAP. CERAMIC | 1000P | | 6KV |
| C410 | C91-1266-05 | CAP. CERAMIC | 1000P | | 6KV |
| C411 | C91-1266-05 | CAP. CERAMIC | 1000P | | 6KV |
| C412 | C91-1309-05 | CAP. CERAMIC | 0.01 | 10% | 500V |
| C413 | C91-1266-05 | CAP. CERAMIC | 1000P | | 6KV |
| C414 | C91-1266-05 | CAP. CERAMIC | 1000P | | 6KV |
| C415 | C91-1309-05 | CAP. CERAMIC | 0.01 | 10% | 500V |
| C416 | C91-1267-05 | CAP. CERAMIC | 4700P | | 3KV |
| C417 | C91-1267-05 | CAP. CERAMIC | 4700P | | 3KV |
| C418 | CS15E1V010M | CAP. TANTALUM | 1 | 20% | 35V |
| C419 | CK45FB1H222K | CAP. CERAMIC | 2200P | 10% | 50V |
| C420 | CQ92FM1H223K | CAP. MYLAR | 0.022 | 10% | 50V |
| C421 | CE04EW1H220M | CAP. ELECTRO | 22 | 20% | 50V |
| C422 | C91-1264-05 | CAP. CERAMIC | 22P | | 3KV |
| C423 | C91-1267-05 | CAP. CERAMIC | 4700P | | 3KV |
| C424 | C91-1267-05 | CAP. CERAMIC | 4700P | | 3KV |
| C425 | C91-1267-05 | CAP. CERAMIC | 4700P | | 3KV |
| C426 | CE04W2C100M | CAP. ELECTRO | 10 | 20% | 160V |
| C427 | C91-1309-05 | CAP. CERAMIC | 0.01 | 10% | 500V |
| C434 | C91-1309-05 | CAP. CERAMIC | 0.01 | 10% | 500V |
| C503 | CC45FSL1H331J | CAP. CERAMIC | 330P | 5% | 50V |
| C504 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C505 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C506 | NO USE | | | | |
| C507 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C701 | CE04EW1H100M | CAP. ELECTRO | 10 | 20% | 50V |
| C702 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C703 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C801 | CE04EW1C102M | CAP. ELECTRO | 1000 | 20% | 16V |
| C802 | CC45CH1H101J | CAP. CERAMIC | 100P | 5% | 50V |
| C803 | CK45F1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C804 | CQ92M1H104K | CAP. MYLAR | 0.1 | 10% | 50V |
| C805 | CK45F1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| D001 | 1SS132 | DIODE | | | |
| D002 | 1SS132 | DIODE | | | |
| D003 | 1SS86 | DIODE | | | |
| D004 | 1SS132 | DIODE | | | |
| D005 | 1S1588 | DIODE | | | |
| D006 | 1SS132 | DIODE | | | |
| D101 | 1SS132 | DIODE | | | |
| D102 | 1SS132 | DIODE | | | |
| D103 | 1S1588 | DIODE | | | |
| D104 | 1S1588 | DIODE | | | |
| D105 | 1SS132 | DIODE | | | |
| D106 | 1SS132 | DIODE | | | |
| D107 | 1SS132 | DIODE | | | |

# PARTS LIST

| REF.NO | PARTS NO | NAME & DESCRIPTION |
|---|---|---|
| D108 | 1SS132 | DIODE |
| D109 | 1SS132 | DIODE |
| D110 | 1SS132 | DIODE |
| D111 | 1SS132 | DIODE |
| D112 | 1SS132 | DIODE |
| D113 | HZS6.8J(B2) | DIODE, ZENER 6.79V |
| D201 | 1S1588 | DIODE |
| D202 | 1S1588 | DIODE |
| D203 | 1S1588 | DIODE |
| D204 | 1SS132 | DIODE |
| D205 | 1SS132 | DIODE |
| D206 | 1SS132 | DIODE |
| D207 | 1SS132 | DIODE |
| D208 | 1SS132 | DIODE |
| D209 | 1SS132 | DIODE |
| D210 | 1SS132 | DIODE |
| D211 | 1S1588 | DIODE |
| D212 | 1SS132 | DIODE |
| D213 | 1SS132 | DIODE |
| D214 | 1S1588 | DIODE |
| D215 | 1SS132 | DIODE |
| D216 | 1SS132 | DIODE |
| D217 | 1SS132 | DIODE |
| D218 | 1S1588 | DIODE |
| D219 | 1SS132 | DIODE |
| D220 | 1SS132 | DIODE |
| D301 | 1S1588 | DIODE |
| D302 | MA700 | DIODE |
| D303 | MA700 | DIODE |
| D304 | 1SS86 | DIODE |
| D305 | 1S1588 | DIODE |
| D306 | 1S1588 | DIODE |
| D307 | 1SS83 | DIODE |
| D401 | 1SS132 | DIODE |
| D402 | HZ2(B3) | DIODE, ZENER 2.2V |
| D403 | HZ2(B3) | DIODE, ZENER 2.2V |
| D404 | 1SS83 | DIODE |
| D405 | 1SS83 | DIODE |
| D406 | 1SS83 | DIODE |
| D407 | 1SS83 | DIODE |
| D408 | 1SS83 | DIODE |
| D409 | 1SS83 | DIODE |
| D410 | 1SS83 | DIODE |
| D411 | 1SS83 | DIODE |
| D412 | 1SS132 | DIODE |
| D413 | HZS5.6J(B2) | DIODE, ZENER 5.62V |
| D414 | 1SS132 | DIODE |
| D415 | 1SS132 | DIODE |
| D416 | Y10GA | DIODE |
| D423 | HZ36L(2) | DIODE, ZENER 36V |
| D424 | HZ36L(2) | DIODE, ZENER 36V |
| D425 | HZ36L(2) | DIODE, ZENER 36V |
| D426 | B30-0957-05 | LED (LN322GPT) |
| D502 | MA700 | DIODE |
| D503 | MA700 | DIODE |
| D504 | 1SS132 | DIODE |
| D505 | 1SS132 | DIODE |
| D506 | 1SS132 | DIODE |
| D507 | 1SS132 | DIODE |
| D508 | NO USE | |
| D509 | 1S1588 | DIODE |
| D510 | MA700 | DIODE |
| D511 | MA700 | DIODE |
| D512 | 1S1588 | DIODE |
| D801 | RD30E(B3) | DIODE ,ZENER 29.09V |
| D802 | 1SS132 | DIODE |
| D803 | 1SS132 | DIODE |
| JW001 | E31-5539-05 | WIRE ASS'Y |
| JW002 | E31-5540-05 | WIRE ASS'Y |
| JW003 | E31-5541-05 | WIRE ASS'Y |
| JW010 | E31-5514-15 | WIRE ASS'Y |
| JW014 | E31-5510-25 | WIRE ASS'Y |
| JW039 | E31-5533-15 | WIRE ASS'Y |
| L101 | L40-2292-02 | FERRI INDUCTOR 2.2UH 20% |

| REF.NO | PARTS NO | NAME & DESCRIPTION |
|---|---|---|
| L201 | L40-2292-02 | FERRI INDUCTOR 2.2UH 20% |
| L401 | L40-1011-13 | FERRI INDUCTOR 100UH 10% |
| NE401 | NE-2B | NEON LAMP |
| NE402 | NE-2B | NEON LAMP |
| P004 | E40-0273-05 | PIN CONNECTOR 2P |
| P007 | E40-0973-05 | PIN CONNECTOR 9P |
| P021 | E40-0273-05 | PIN CONNECTOR 2P |
| P022 | E40-0673-05 | PIN CONNECTOR 6P |
| P023 | E23-0401-05 | PIN TERMINAL |
| P024 | E40-0373-05 | PIN CONNECTOR 3P |
| P025 | E40-0573-05 | PIN CONNECTOR 5P |
| P026 | E40-0273-05 | PIN CONNECTOR 2P |
| P027 | NO USE | |
| P028 | E40-0373-05 | PIN CONNECTOR 3P |
| P029 | E40-0873-05 | PIN CONNECTOR 8P |
| P030 | E40-0273-05 | PIN CONNECTOR 2P |
| P031 | E40-0373-05 | PIN CONNECTOR 3P |
| P032 | E23-0401-05 | PIN TERMINAL |
| P033 | E40-0573-05 | PIN CONNECTOR 5P |
| P034 | E23-0401-05 | PIN TERMINAL |
| P035 | NO USE | |
| P036 | E40-0373-05 | PIN CONNECTOR 3P |
| P037 | E40-0373-05 | PIN CONNECTOR 3P |
| P038 | E40-0473-05 | PIN CONNECTOR 4P |
| P039 | E40-0473-05 | PIN CONNECTOR 4P |
| P040 | NO USE | |
| P041 | E40-0273-05 | PIN CONNECTOR 2P |
| P042 | E40-0373-05 | PIN CONNECTOR 3P |
| P043 | E23-0401-05 | PIN TERMINAL |
| P044 | E23-0401-05 | PIN TERMINAL |
| P045 | E40-0273-05 | PIN CONNECTOR 2P |
| P046 | E40-7033-05 | PIN CONNECTOR 2P |
| P047 | E40-5331-05 | PIN CONNECTOR 5P |
| P048 | E40-0273-05 | PIN CONNECTOR 2P |
| P049 | NO USE | |
| P050 | E40-0473-05 | PIN CONNECTOR 4P |
| P051 | E40-0273-05 | PIN CONNECTOR 2P |
| P052 | E40-0473-05 | PIN CONNECTOR 4P |
| P053 | E40-0273-05 | PIN CONNECTOR 2P |
| P080 | E40-0673-05 | PIN CONNECTOR 6P |
| P081 | E40-0216-05 | PIN CONNECTOR 2P |
| P412 | E40-0373-05 | PIN CONNECTOR 3P |
| Q001 | 2SA1005(K) | TR. SI. PNP |
| Q002 | 2SA1005(K) | TR. SI. PNP |
| Q003 | 2SK304(E) | FET. N-CHANNEL |
| Q004 | 2SC1907 | TR. SI. NPN |
| Q005 | 2SC1907 | TR. SI. NPN |
| Q006 | 2SA844(D) | TR. SI. PNP |
| Q007 | 2SA844(D) | TR. SI. PNP |
| Q008 | 2SA844(D) | TR. SI. PNP |
| Q009 | 2SA844(D) | TR. SI. PNP |
| Q010 | 2SK117(BL) | FET. N-CHANNEL |
| Q011 | 2SA838(B) | TR. SI. PNP |
| Q012 | 2SA1015(Y) | TR. SI. PNP |
| Q013 | 2SC1907 | TR. SI. NPN |
| Q014 | 2SA844(D) | TR. SI. PNP |
| Q015 | 2SC1907 | TR. SI. NPN |
| Q016 | 2SC945(Q) | TR. SI. NPN |
| Q017 | 2SC945(Q) | TR. SI. NPN |
| Q018 | 2SA844(D) | TR. SI. PNP |
| Q101 | 2SA844(D) | TR. SI. PNP |
| Q102 | 2SA844(D) | TR. SI. PNP |
| Q103 | 2SA844(D) | TR. SI. PNP |
| Q104 | 2SA838(B) | TR. SI. PNP |
| Q105 | 2SC1843(E) | TR. SI. NPN |
| Q106 | 2SK117(BL) | FET. N-CHANNEL |
| Q107 | 2SK170(V) | FET. N-CHANNEL |
| Q108 | 2SA844(D) | TR. SI. PNP |
| Q109 | 2SA844(D) | TR. SI. PNP |
| Q110 | 2SC945(Q) | TR. SI. NPN |
| Q111 | 2SC945(Q) | TR. SI. NPN |
| Q112 | 2SC945(Q) | TR. SI. NPN |
| Q113 | 2SC945(Q) | TR. SI. NPN |
| Q201 | 2SA844(D) | TR. SI. PNP |
| Q202 | 2SA844(D) | TR. SI. PNP |

# PARTS LIST

| REF.NO | PARTS NO | NAME & DESCRIPTION |
|---|---|---|
| Q203 | 2SA844(D) | TR. SI. PNP |
| Q204 | 2SA838(B) | TR. SI. PNP |
| Q205 | 2SC1843(E) | TR. SI. NPN |
| Q206 | 2SK117(BL) | FET. N-CHANNEL |
| Q207 | 2SK170(V) | FET. N-CHANNEL |
| Q208 | 2SA844(D) | TR. SI. PNP |
| Q209 | 2SA844(D) | TR. SI. PNP |
| Q210 | 2SA1015(Y) | TR. SI. PNP |
| Q211 | 2SK170(V) | FET. N-CHANNEL |
| Q212 | 2SK170(V) | FET. N-CHANNEL |
| Q213 | 2SC945(Q) | TR. SI. NPN |
| Q214 | 2SA844(D) | TR. SI. PNP |
| Q215 | 2SA844(D) | TR. SI. PNP |
| Q216 | 2SC945(Q) | TR. SI. NPN |
| Q217 | 2SC945(Q) | TR. SI. NPN |
| Q218 | 2SC945(Q) | TR. SI. NPN |
| Q219 | 2SA1005(K) | TR. SI. PNP |
| Q220 | 2SA1005(K) | TR. SI. PNP |
| Q221 | 2SC945(Q) | TR. SI. NPN |
| Q301 | 2SC945(Q) | TR. SI. NPN |
| Q302 | 2SC945(Q) | TR. SI. NPN |
| Q303 | 2SA1015(Y) | TR. SI. PNP |
| Q304 | 2SA1015(Y) | TR. SI. PNP |
| Q305 | 2SC1907 | TR. SI. NPN |
| Q306 | 2SC1907 | TR. SI. NPN |
| Q307 | 2SC1907 | TR. SI. NPN |
| Q308 | 2SA838(B) | TR. SI. PNP |
| Q309 | 2SD668A(C) | TR. SI. NPN |
| Q310 | 2SD668A(C) | TR. SI. NPN |
| Q311 | 2SB648A(C) | TR. SI. PNP |
| Q312 | 2SB648A(C) | TR. SI. PNP |
| Q401 | 2SA1005(K) | TR. SI. PNP |
| Q402 | 2SA1005(K) | TR. SI. PNP |
| Q403 | 2SC1907 | TR. SI. NPN |
| Q404 | 2SC1907 | TR. SI. NPN |
| Q405 | 2SD668A(C) | TR. SI. NPN |
| Q406 | 2SD668A(C) | TR. SI. NPN |
| Q407 | 2SD668A(C) | TR. SI. NPN |
| Q408 | 2SD668A(C) | TR. SI. NPN |
| Q409 | 2SD880(Y) | TR. SI. NPN |
| Q410 | 2SC945(Q) | TR. SI. NPN |
| Q411 | 2SA1015(Y) | TR. SI. PNP |
| Q501 | 2SC1907 | TR. SI. NPN |
| Q502 | 2SC1907 | TR. SI. NPN |
| Q503 | 2SA1005(K) | TR. SI. PNP |
| Q504 | 2SA1005(K) | TR. SI. PNP |
| Q505 | 2SA1005(K) | TR. SI. PNP |
| Q506 | 2SC945(Q) | TR. SI. NPN |
| R001 | RD14BB2C220J | RES. CARBON 22 5% 1/6W |
| R002 | RD14BB2C102J | RES. CARBON 1K 5% 1/6W |
| R003 | RN14BK2C1001F | RES. METAL FILM 1K 1% 1/6W |
| R004 | RD14BB2C681J | RES. CARBON 680 5% 1/6W |
| R005 | RD14BB2C912J | RES. CARBON 9.1K 5% 1/6W |
| R006 | RD14BB2C302J | RES. CARBON 3K 5% 1/6W |
| R007 | RD14BB2E220J | RES. CARBON 22 5% 1/4W |
| R008 | RD14BB2C560J | RES. CARBON 56 5% 1/6W |
| R009 | RD14BB2C103J | RES. CARBON 10K 5% 1/6W |
| R010 | RD14BB2C473J | RES. CARBON 47K 5% 1/6W |
| R011 | RN14BK2E1004F | RES. METAL FILM 1M 1% 1/4W |
| R012 | RD14BB2C103J | RES. CARBON 10K 5% 1/6W |
| R013 | RD14BB2C330J | RES. CARBON 33 5% 1/6W |
| R014 | RD14BB2C152J | RES. CARBON 1.5K 5% 1/6W |
| R015 | RD14BB2C151J | RES. CARBON 150 5% 1/6W |
| R016 | RD14BB2C392J | RES. CARBON 3.9K 5% 1/6W |
| R017 | RD14BB2C392J | RES. CARBON 3.9K 5% 1/6W |
| R018 | RD14BB2C222J | RES. CARBON 2.2K 5% 1/6W |
| R019 | RD14BB2C102J | RES. CARBON 1K 5% 1/6W |
| R020 | RD14BB2C681J | RES. CARBON 680 5% 1/6W |
| R021 | RD14BB2C681J | RES. CARBON 680 5% 1/6W |
| R022 | RD14BB2C681J | RES. CARBON 680 5% 1/6W |
| R023 | RD14BB2C681J | RES. CARBON 680 5% 1/6W |
| R024 | RD14BB2C104J | RES. CARBON 100K 5% 1/6W |
| R025 | RD14BB2C104J | RES. CARBON 100K 5% 1/6W |
| R026 | RD14BB2C103J | RES. CARBON 10K 5% 1/6W |
| R027 | RD14BB2C222J | RES. CARBON 2.2K 5% 1/6W |
| R028 | RD14BB2C223J | RES. CARBON 22K 5% 1/6W |
| R029 | RD14BB2C474J | RES. CARBON 470K 5% 1/6W |
| R030 | RD14BB2C474J | RES. CARBON 470K 5% 1/6W |
| R031 | RD14BB2C301J | RES. CARBON 300 5% 1/6W |
| R032 | RD14BB2C910J | RES. CARBON 91 5% 1/6W |
| R033 | RD14BB2C271J | RES. CARBON 270 5% 1/6W |

| REF.NO | PARTS NO | NAME & DESCRIPTION |
|---|---|---|
| R034 | RD14BB2C201J | RES. CARBON 200 5% 1/6W |
| R035 | RD14BB2C102J | RES. CARBON 1K 5% 1/6W |
| R036 | RD14BB2C103J | RES. CARBON 10K 5% 1/6W |
| R037 | RD14BB2C222J | RES. CARBON 2.2K 5% 1/6W |
| R038 | RD14BB2C202J | RES. CARBON 2K 5% 1/6W |
| R039 | RD14BB2C474J | RES. CARBON 470K 5% 1/6W |
| R040 | RD14BB2C473J | RES. CARBON 47K 5% 1/6W |
| R041 | RD14BB2C331J | RES. CARBON 330 5% 1/6W |
| R042 | RD14BB2C220J | RES. CARBON 22 5% 1/6W |
| R043 | RD14BB2C561J | RES. CARBON 560 5% 1/6W |
| R044 | RD14BB2C391J | RES. CARBON 390 5% 1/6W |
| R045 | RD14BB2C272J | RES. CARBON 2.7K 5% 1/6W |
| R046 | RD14BB2C272J | RES. CARBON 2.7K 5% 1/6W |
| R047 | RD14BB2C102J | RES. CARBON 1K 5% 1/6W |
| R048 | RD14BB2C681J | RES. CARBON 680 5% 1/6W |
| R049 | RD14BB2C123J | RES. CARBON 12K 5% 1/6W |
| R050 | RD14BB2C152J | RES. CARBON 1.5K 5% 1/6W |
| R051 | RD14BB2C332J | RES. CARBON 3.3K 5% 1/6W |
| R052 | RD14BB2C223J | RES. CARBON 22K 5% 1/6W |
| R053 | RD14BB2C100J | RES. CARBON 10 5% 1/6W |
| R101 | RD14BB2C473J | RES. CARBON 47K 5% 1/6W |
| R102 | RD14BB2C151J | RES. CARBON 150 5% 1/6W |
| R103 | RD14BB2C181J | RES. CARBON 180 5% 1/6W |
| R104 | RD14BB2C470J | RES. CARBON 47 5% 1/6W |
| R105 | RD14BB2C470J | RES. CARBON 47 5% 1/6W |
| R106 | RD14BB2C152J | RES. CARBON 1.5K 5% 1/6W |
| R107 | RD14BB2C102J | RES. CARBON 1K 5% 1/6W |
| R108 | RD14BB2C470J | RES. CARBON 47 5% 1/6W |
| R109 | RD14BB2C102J | RES. CARBON 1K 5% 1/6W |
| R110 | RD14BB2C223J | RES. CARBON 22K 5% 1/6W |
| R111 | RD14BB2C331J | RES. CARBON 330 5% 1/6W |
| R112 | RD14BB2C330J | RES. CARBON 33 5% 1/6W |
| R113 | RD14BB2C153J | RES. CARBON 15K 5% 1/6W |
| R114 | RD14BB2C472J | RES. CARBON 4.7K 5% 1/6W |
| R115 | RD14BB2C333J | RES. CARBON 33K 5% 1/6W |
| R116 | RD14BB2C103J | RES. CARBON 10K 5% 1/6W |
| R117 | RN14BK2E3004F | RES. METAL FILM 3M 1% 1/4W |
| R118 | RN14BK2C1004F | RES. METAL FILM 1M 1% 1/6W |
| R119 | RN14BK2C5003F | RES. METAL FILM 500K 1% 1/6W |
| R120 | RN14BK2C3003F | RES. METAL FILM 300K 1% 1/6W |
| R121 | RN14BK2C1003F | RES. METAL FILM 100K 1% 1/6W |
| R122 | RN14BK2C5002F | RES. METAL FILM 50K 1% 1/6W |
| R123 | RN14BK2C3002F | RES. METAL FILM 30K 1% 1/6W |
| R124 | RN14BK2C1002F | RES. METAL FILM 10K 1% 1/6W |
| R125 | RN14BK2C5001F | RES. METAL FILM 5K 1% 1/6W |
| R126 | RN14BK2C3001F | RES. METAL FILM 3K 1% 1/6W |
| R127 | RN14BK2C1001F | RES. METAL FILM 1K 1% 1/6W |
| R128 | RN14BK2C1001F | RES. METAL FILM 1K 1% 1/6W |
| R129 | RD14BB2C392J | RES. CARBON 3.9K 5% 1/6W |
| R130 | RD14BB2C183J | RES. CARBON 18K 5% 1/6W |
| R131 | RD14BB2C121J | RES. CARBON 120 5% 1/6W |
| R132 | RD14BB2C222J | RES. CARBON 2.2K 5% 1/6W |
| R133 | RD14BB2C222J | RES. CARBON 2.2K 5% 1/6W |
| R134 | RD14BB2C103J | RES. CARBON 10K 5% 1/6W |
| R135 | RD14BB2C101J | RES. CARBON 100 5% 1/6W |
| R136 | RD14BB2C223J | RES. CARBON 22K 5% 1/6W |
| R137 | RD14BB2C561J | RES. CARBON 560 5% 1/6W |
| R138 | RD14BB2C103J | RES. CARBON 10K 5% 1/6W |
| R139 | RD14BB2C821J | RES. CARBON 820 5% 1/6W |
| R140 | RD14BB2C222J | RES. CARBON 2.2K 5% 1/6W |
| R141 | RD14BB2C102J | RES. CARBON 1K 5% 1/6W |
| R142 | RD14BB2C221J | RES. CARBON 220 5% 1/6W |
| R143 | RN14BK2C2002F | RES. METAL FILM 20K 1% 1/6W |
| R144 | RN14BK2C3302F | RES. METAL FILM 33K 1% 1/6W |
| R145 | RD14BB2C103J | RES. CARBON 10K 5% 1/6W |
| R146 | RD14BB2C103J | RES. CARBON 10K 5% 1/6W |
| R147 | RD14BB2C682J | RES. CARBON 6.8K 5% 1/6W |
| R148 | RD14BB2C392J | RES. CARBON 3.9K 5% 1/6W |
| R149 | RD14BB2C220J | RES. CARBON 22 5% 1/6W |
| R150 | RD14BB2C100J | RES. CARBON 10 5% 1/6W |
| R151 | RD14BB2C100J | RES. CARBON 10 5% 1/6W |
| R201 | RD14BB2C151J | RES. CARBON 150 5% 1/6W |
| R202 | RD14BB2C181J | RES. CARBON 180 5% 1/6W |
| R203 | RD14BB2C470J | RES. CARBON 47 5% 1/6W |
| R204 | RD14BB2C470J | RES. CARBON 47 5% 1/6W |
| R205 | RD14BB2C152J | RES. CARBON 1.5K 5% 1/6W |
| R206 | RD14BB2C102J | RES. CARBON 1K 5% 1/6W |
| R207 | RD14BB2C102J | RES. CARBON 1K 5% 1/6W |
| R208 | RD14BB2C470J | RES. CARBON 47 5% 1/6W |
| R209 | RD14BB2C223J | RES. CARBON 22K 5% 1/6W |
| R210 | RD14BB2C331J | RES. CARBON 330 5% 1/6W |
| R211 | RD14BB2C330J | RES. CARBON 33 5% 1/6W |
| R212 | RD14BB2C183J | RES. CARBON 18K 5% 1/6W |

# PARTS LIST

| REF.NO | PARTS NO | NAME & DESCRIPTION | | | |
|---|---|---|---|---|---|
| R213 | RD14BB2C183J | RES. CARBON | 18K | 5% | 1/6W |
| R214 | RD14BB2C333J | RES. CARBON | 33K | 5% | 1/6W |
| R215 | RD14BB2C103J | RES. CARBON | 10K | 5% | 1/6W |
| R216 | RN14BK2E3004F | RES. METAL FILM | 3M | 1% | 1/4W |
| R217 | RN14BK2C1004F | RES. METAL FILM | 1M | 1% | 1/6W |
| R218 | RN14BK2C5003F | RES. METAL FILM | 500K | 1% | 1/6W |
| R219 | RN14BK2C3003F | RES. METAL FILM | 300K | 1% | 1/6W |
| R220 | RN14BK2C1003F | RES. METAL FILM | 100K | 1% | 1/6W |
| R221 | RN14BK2C5002F | RES. METAL FILM | 50K | 1% | 1/6W |
| R222 | RN14BK2C3002F | RES. METAL FILM | 30K | 1% | 1/6W |
| R223 | RN14BK2C1002F | RES. METAL FILM | 10K | 1% | 1/6W |
| R224 | RN14BK2C5001F | RES. METAL FILM | 5K | 1% | 1/6W |
| R225 | RN14BK2C3001F | RES. METAL FILM | 3K | 1% | 1/6W |
| R226 | RN14BK2C1001F | RES. METAL FILM | 1K | 1% | 1/6W |
| R227 | RN14BK2C1001F | RES. METAL FILM | 1K | 1% | 1/6W |
| R228 | RD14BB2C392J | RES. CARBON | 3.9K | 5% | 1/6W |
| R229 | RD14BB2C183J | RES. CARBON | 18K | 5% | 1/6W |
| R230 | RD14BB2C121J | RES. CARBON | 120 | 5% | 1/6W |
| R231 | RD14BB2C222J | RES. CARBON | 2.2K | 5% | 1/6W |
| R232 | RD14BB2C182J | RES. CARBON | 1.8K | 5% | 1/6W |
| R233 | RD14BB2C103J | RES. CARBON | 10K | 5% | 1/6W |
| R234 | RD14BB2C471J | RES. CARBON | 470 | 5% | 1/6W |
| R235 | RD14BB2C153J | RES. CARBON | 15K | 5% | 1/6W |
| R236 | RD14BB2C822J | RES. CARBON | 8.2K | 5% | 1/6W |
| R237 | RD14BB2C122J | RES. CARBON | 1.2K | 5% | 1/6W |
| R238 | RD14BB2C242J | RES. CARBON | 2.4K | 5% | 1/6W |
| R239 | RD14BB2C472J | RES. CARBON | 4.7K | 5% | 1/6W |
| R240 | RD14BB2C822J | RES. CARBON | 8.2K | 5% | 1/6W |
| R241 | RD14BB2C561J | RES. CARBON | 560 | 5% | 1/6W |
| R242 | RD14BB2C563J | RES. CARBON | 56K | 5% | 1/6W |
| R243 | RD14BB2C222J | RES. CARBON | 2.2K | 5% | 1/6W |
| R244 | RD14BB2C221J | RES. CARBON | 220 | 5% | 1/6W |
| R245 | RD14BB2C561J | RES. CARBON | 560 | 5% | 1/6W |
| R248 | RN14BK2C2002F | RES. METAL FILM | 20K | 1% | 1/6W |
| R249 | RN14BK2C3302F | RES. METAL FILM | 33K | 1% | 1/6W |
| R250 | RD14BB2C103J | RES. CARBON | 10K | 5% | 1/6W |
| R251 | RD14BB2C561J | RES. CARBON | 560 | 5% | 1/6W |
| R252 | RD14BB2C471J | RES. CARBON | 470 | 5% | 1/6W |
| R253 | RD14BB2C103J | RES. CARBON | 10K | 5% | 1/6W |
| R254 | RD14BB2C103J | RES. CARBON | 10K | 5% | 1/6W |
| R255 | RD14BB2C223J | RES. CARBON | 22K | 5% | 1/6W |
| R256 | RD14BB2C333J | RES. CARBON | 33K | 5% | 1/6W |
| R257 | RD14BB2C562J | RES. CARBON | 5.6K | 5% | 1/6W |
| R258 | RD14BB2C332J | RES. CARBON | 3.3K | 5% | 1/6W |
| R259 | RD14BB2C102J | RES. CARBON | 1K | 5% | 1/6W |
| R260 | RD14BB2C472J | RES. CARBON | 4.7K | 5% | 1/6W |
| R261 | RD14BB2C392J | RES. CARBON | 3.9K | 5% | 1/6W |
| R262 | RD14BB2C103J | RES. CARBON | 10K | 5% | 1/6W |
| R263 | RD14BB2C103J | RES. CARBON | 10K | 5% | 1/6W |
| R264 | RD14BB2C102J | RES. CARBON | 1K | 5% | 1/6W |
| R265 | RD14BB2C102J | RES. CARBON | 1K | 5% | 1/6W |
| R266 | RD14BB2C102J | RES. CARBON | 1K | 5% | 1/6W |
| R267 | RD14BB2C332J | RES. CARBON | 3.3K | 5% | 1/6W |
| R268 | RD14BB2C100J | RES. CARBON | 10 | 5% | 1/6W |
| R269 | RD14BB2C100J | RES. CARBON | 10 | 5% | 1/6W |
| R301 | RD14BB2C471J | RES. CARBON | 470 | 5% | 1/6W |
| R302 | RD14BB2C392J | RES. CARBON | 3.9K | 5% | 1/6W |
| R303 | RN14BK2E1501F | RES. METAL FILM | 1.5K | 1% | 1/4W |
| R304 | RD14BB2C332J | RES. CARBON | 3.3K | 5% | 1/6W |
| R305 | RD14BB2C332J | RES. CARBON | 3.3K | 5% | 1/6W |
| R306 | RD14BB2C682J | RES. CARBON | 6.8K | 5% | 1/6W |
| R307 | RD14BB2C471J | RES. CARBON | 470 | 5% | 1/6W |
| R308 | RD14BB2C102J | RES. CARBON | 1K | 5% | 1/6W |
| R309 | RD14BB2C102J | RES. CARBON | 1K | 5% | 1/6W |
| R310 | RN14BK2E47R0F | RES. METAL FILM | 47.0 | 1% | 1/4W |
| R311 | RD14BB2C122J | RES. CARBON | 1.2K | 5% | 1/6W |
| R312 | RD14BB2C122J | RES. CARBON | 1.2K | 5% | 1/6W |
| R313 | RN14BK2C1001F | RES. METAL FILM | 1K | 1% | 1/6W |
| R314 | RN14BK2C1001F | RES. METAL FILM | 1K | 1% | 1/6W |
| R315 | RN14BK2C7500F | RES. METAL FILM | 750 | 1% | 1/6W |
| R316 | RD14BB2C331J | RES. CARBON | 330 | 5% | 1/6W |
| R317 | RD14BB2C331J | RES. CARBON | 330 | 5% | 1/6W |
| R318 | RD14BB2C123J | RES. CARBON | 12K | 5% | 1/6W |
| R319 | RD14BB2C222J | RES. CARBON | 2.2K | 5% | 1/6W |
| R320 | RD14BB2C222J | RES. CARBON | 2.2K | 5% | 1/6W |
| R321 | RD14BB2C393J | RES. CARBON | 39K | 5% | 1/6W |
| R322 | RD14BB2C104J | RES. CARBON | 100K | 5% | 1/6W |
| R323 | RD14BB2C104J | RES. CARBON | 100K | 5% | 1/6W |
| R324 | RD14BB2C152J | RES. CARBON | 1.5K | 5% | 1/6W |
| R325 | RD14BB2C152J | RES. CARBON | 1.5K | 5% | 1/6W |
| R326 | RD14BB2C331J | RES. CARBON | 330 | 5% | 1/6W |
| R327 | RD14BB2C331J | RES. CARBON | 330 | 5% | 1/6W |
| R328 | RN14BK2C1003F | RES. METAL FILM | 100K | 1% | 1/6W |

| REF.NO | PARTS NO | NAME & DESCRIPTION | | | |
|---|---|---|---|---|---|
| R329 | RN14BK2C1003F | RES. METAL FILM | 100K | 1% | 1/6W |
| R330 | RD14BB2C470J | RES. CARBON | 47 | 5% | 1/6W |
| R331 | RD14BB2C470J | RES. CARBON | 47 | 5% | 1/6W |
| R401 | RD14BB2C332J | RES. CARBON | 3.3K | 5% | 1/6W |
| R402 | RD14BB2C561J | RES. CARBON | 560 | 5% | 1/6W |
| R403 | RD14BB2C101J | RES. CARBON | 100 | 5% | 1/6W |
| R404 | RD14BB2C123J | RES. CARBON | 12K | 5% | 1/6W |
| R405 | RD14BB2C101J | RES. CARBON | 100 | 5% | 1/6W |
| R406 | RD14BB2C221J | RES. CARBON | 220 | 5% | 1/6W |
| R407 | RD14BB2C332J | RES. CARBON | 3.3K | 5% | 1/6W |
| R408 | RD14BB2C331J | RES. CARBON | 330 | 5% | 1/6W |
| R409 | RD14BB2C472J | RES. CARBON | 4.7K | 5% | 1/6W |
| R410 | RD14BB2C472J | RES. CARBON | 4.7K | 5% | 1/6W |
| R411 | RD14BB2C473J | RES. CARBON | 47K | 5% | 1/6W |
| R412 | RD14BB2C331J | RES. CARBON | 330 | 5% | 1/6W |
| R413 | RD14BB2C472J | RES. CARBON | 4.7K | 5% | 1/6W |
| R414 | RD14DB2H473J | RES. CARBON | 47K | 5% | 1/2W |
| R415 | RD14DB2H473J | RES. CARBON | 47K | 5% | 1/2W |
| R416 | RD14BB2C222J | RES. CARBON | 2.2K | 5% | 1/6W |
| R417 | RD14DB2H473J | RES. CARBON | 47K | 5% | 1/2W |
| R418 | RD14DB2H473J | RES. CARBON | 47K | 5% | 1/2W |
| R419 | RD14BB2C681J | RES. CARBON | 680 | 5% | 1/6W |
| R420 | RD14BB2C681J | RES. CARBON | 680 | 5% | 1/6W |
| R421 | RD14BB2C101J | RES. CARBON | 100 | 5% | 1/6W |
| R422 | RD14BB2C101J | RES. CARBON | 100 | 5% | 1/6W |
| R423 | RD14BB2E332J | RES. CARBON | 3.3K | 5% | 1/4W |
| R424 | R92-1057-05 | RES. METAL FILM | 2.2M | 5% | 1/2W |
| R425 | RD14BB2C823J | RES. CARBON | 82K | 5% | 1/6W |
| R426 | R92-1057-05 | RES. METAL FILM | 2.2M | 5% | 1/2W |
| R427 | R92-1007-05 | RES. CARBON | 10M | 5% | 1/2W |
| R428 | R92-1007-05 | RES. CARBON | 10M | 5% | 1/2W |
| R429 | RD14BB2E102J | RES. CARBON | 1K | 5% | 1/4W |
| R430 | RD14BB2E102J | RES. CARBON | 1K | 5% | 1/4W |
| R431 | RD14BB2C101J | RES. CARBON | 100 | 5% | 1/6W |
| R432 | RD14BB2C101J | RES. CARBON | 100 | 5% | 1/6W |
| R433 | R92-1057-05 | RES. METAL FILM | 2.2M | 5% | 1/2W |
| R434 | RD14BB2C103J | RES. CARBON | 10K | 5% | 1/6W |
| R435 | R92-1007-05 | RES. CARBON | 10M | 5% | 1/2W |
| R436 | R92-1007-05 | RES. CARBON | 10M | 5% | 1/2W |
| R437 | R92-1418-05 | RES. METAL | 6.8M | 1% | 1W |
| R438 | R92-1419-05 | RES. METAL FILM | 10M | 1% | 1W |
| R439 | RD14BB2C471J | RES. CARBON | 470 | 5% | 1/6W |
| R440 | RN14BK2C1103F | RES. METAL FILM | 110K | 1% | 1/6W |
| R441 | RD14BB2C472J | RES. CARBON | 4.7K | 5% | 1/6W |
| R442 | RN14BK2C8201F | RES. METAL FILM | 8.2K | 1% | 1/6W |
| R443 | RN14BK2C1202F | RES. METAL FILM | 12K | 1% | 1/6W |
| R444 | RD14BB2C102J | RES. CARBON | 1K | 5% | 1/6W |
| R445 | RD14BB2C332J | RES. CARBON | 3.3K | 5% | 1/6W |
| R446 | RS14GB3A1R0J | RES. METAL FILM | 1 | 5% | 1W |
| R447 | RD14DB2H223J | RES. CARBON | 22K | 5% | 1/2W |
| R448 | RD14BB2C104J | RES. CARBON | 100K | 5% | 1/6W |
| R449 | RD14BB2C473J | RES. CARBON | 47K | 5% | 1/6W |
| R450 | NO USE | | | | |
| R451 | RD14BB2C681J | RES. CARBON | 680 | 5% | 1/6W |
| R452 | RD14BB2C470J | RES. CARBON | 47 | 5% | 1/6W |
| R453 | RS14GB3A102J | RES. METAL FILM | 1K | 5% | 1W |
| R454 | RS14GB3A750J | RES. METAL FILM | 75 | 5% | 1W |
| R455 | RS14GB3A750J | RES. METAL FILM | 75 | 5% | 1W |
| R456 | RD14BB2C304J | RES. CARBON | 300K | 5% | 1/6W |
| R457 | RD14BB2C682J | RES. CARBON | 6.8K | 5% | 1/6W |
| R501 | RD14BB2C104J | RES. CARBON | 100K | 5% | 1/6W |
| R502 | RD14BB2C104J | RES. CARBON | 100K | 5% | 1/6W |
| R503 | RD14BB2C103J | RES. CARBON | 10K | 5% | 1/6W |
| R504 | RD14BB2C332J | RES. CARBON | 3.3K | 5% | 1/6W |
| R505 | RD14BB2C102J | RES. CARBON | 1K | 5% | 1/6W |
| R506 | RN14BK2C3301F | RES. METAL FILM | 3.3K | 1% | 1/6W |
| R507 | RN14BK2C3301F | RES. METAL FILM | 3.3K | 1% | 1/6W |
| R508 | RD14BB2C122J | RES. CARBON | 1.2K | 5% | 1/6W |
| R509 | RD14BB2C561J | RES. CARBON | 560 | 5% | 1/6W |
| R510 | RD14BB2C103J | RES. CARBON | 10K | 5% | 1/6W |
| R511 | RD14BB2C103J | RES. CARBON | 10K | 5% | 1/6W |
| R512 | RD14BB2C751J | RES. CARBON | 750 | 5% | 1/6W |
| R515 | RN14BK2C8201F | RES. METAL FILM | 8.2K | 1% | 1/6W |
| R516 | RN14BK2C2201F | RES. METAL FILM | 2.2K | 1% | 1/6W |
| R517 | RN14BK2C8200F | RES. METAL FILM | 820 | 1% | 1/6W |
| R518 | RD14BB2C472J | RES. CARBON | 4.7K | 5% | 1/6W |
| R519 | RD14BB2C103J | RES. CARBON | 10K | 5% | 1/6W |
| R520 | RD14BB2C104J | RES. CARBON | 100K | 5% | 1/6W |
| R521 | RD14BB2C622J | RES. CARBON | 6.2K | 5% | 1/6W |
| R522 | RD14BB2C472J | RES. CARBON | 4.7K | 5% | 1/6W |
| R523 | RD14BB2C472J | RES. CARBON | 4.7K | 5% | 1/6W |
| R524 | RD14BB2C101J | RES. CARBON | 100 | 5% | 1/6W |

# PARTS LIST

| REF.NO | PARTS NO | NAME & DESCRIPTION | | | |
|---|---|---|---|---|---|
| R525 | RD14BB2C222J | RES. CARBON | 2.2K | 5% | 1/6W |
| R526 | RD14BB2C102J | RES. CARBON | 1K | 5% | 1/6W |
| R527 | RD14BB2C103J | RES. CARBON | 10K | 5% | 1/6W |
| R528 | RD14BB2C303J | RES. CARBON | 30K | 5% | 1/6W |
| R529 | RD14BB2C103J | RES. CARBON | 10K | 5% | 1/6W |
| R530 | RD14BB2C474J | RES. CARBON | 470K | 5% | 1/6W |
| R531 | RD14BB2C472J | RES. CARBON | 4.7K | 5% | 1/6W |
| R532 | RD14BB2C472J | RES. CARBON | 4.7K | 5% | 1/6W |
| R533 | RD14BB2C103J | RES. CARBON | 10K | 5% | 1/6W |
| R534 | R90-0665-05 | RES. NETWORK | 7X10K | | |
| R535 | RD14BB2C103J | RES. CARBON | 10K | 5% | 1/6W |
| R536 | RD14BB2C103J | RES. CARBON | 10K | 5% | 1/6W |
| R537 | RD14BB2C103J | RES. CARBON | 10K | 5% | 1/6W |
| R701 | R90-0664-05 | RES. NETWORK | 10X10K | | |
| R702 | R90-0664-05 | RES. NETWORK | 10X10K | | |
| R801 | RD14BB2C151J | RES. CARBON | 150 | 5% | 1/6W |
| R802 | RD14BB2C120J | RES. CARBON | 12 | 5% | 1/6W |
| R803 | RD14BB2C103J | RES. CARBON | 10K | 5% | 1/6W |
| R804 | RD14BB2C561J | RES. CARBON | 560 | 5% | 1/6W |
| R805 | RD14BB2C163J | RES. CARBON | 16K | 5% | 1/6W |
| R806 | RD14BB2C272J | RES. CARBON | 2.7K | 5% | 1/6W |
| S001 | S33-2501-05 | LEVER SWITCH 2-5 | | | |
| S002 | S32-4008-05 | LEVER SWITCH 4-5 | | | |
| S101 | S33-4503-05 | LEVER SWITCH 4-5 (H.MODE) | | | |
| S102 | S29-4502-05 | ROTARY SWITCH (SWEEP TIME) | | | |
| S202 | S32-4009-05 | LEVER SWITCH 4-4 | | | |
| S501 | S33-2501-05 | LEVER SWITCH 2-5 | | | |
| T401 | L19-0421-05 | CONVERTOR TRANSFORMER | | | |
| TC101 | C05-0454-05 | CAP. TRIMMER | 20PF | | |
| TC201 | C05-0454-05 | CAP. TRIMMER | 20PF | | |
| U001 | SN74LS00N | IC. QUAD 2 INPUT NAND | | | |
| U101 | SN74LS00N | IC. QUAD 2 INPUT NAND | | | |
| U102 | SN74LS112AN | IC. DUAL JK-FF | | | |
| U103 | TL081CP | IC. BI-FET O.P AMP | | | |
| U104 | TC4053BP | IC. 2-CH ANALOG MULTIPLEXER | | | |
| U201 | SN74LS112AN | IC. DUAL JK-FF | | | |
| U202 | TL081CP | IC. BI-FET O.P AMP | | | |
| U203 | SN74LS112AN | IC. DUAL JK-FF | | | |
| U401 | LF13741N | IC. MONOLITHIC JFET INPUT OP | | | |
| U501 | TC74HC123AP | IC.DUAL RETRIGG. MOND. MULTIVI | | | |
| U502 | NJM4558D | IC.DUAL OP AMP | | | |
| U701 | DTM-5020 | IC. GATE ARRAY | | | |
| U702 | DTM-5020 | IC. GATE ARRAY | | | |
| VR001 | R12-2522-05 | RES. SEMI FIXED 5K B | | | |
| VR002 | R12-0575-05 | RES. SEMI FIXED 100 B | | | |
| VR003 | R12-0577-05 | RES. SEMI FIXED 500 B | | | |
| VR101 | R12-3549-05 | RES. SEMI FIXED 10K B | | | |
| VR102 | R06-3502-05 | V.R. | 10K B | | |
| VR201 | R12-3549-05 | RES. SEMI FIXED 10K B | | | |
| VR202 | R12-1545-05 | RES. SEMI FIXED 1K B | | | |
| VR203 | R12-1545-05 | RES. SEMI FIXED 1K B | | | |
| VR204 | R12-3550-05 | RES. SEMI FIXED 20K B | | | |
| VR301 | R12-1546-05 | RES. SEMI FIXED 2K B | | | |
| VR302 | R12-0575-05 | RES. SEMI FIXED 100 B | | | |
| VR401 | R12-4516-05 | RES. SEMI FIXED 50K B | | | |
| VR402 | R12-8501-05 | RES. SEMI FIXED 2.2M B | | | |
| VR403 | R12-3549-05 | RES. SEMI FIXED 10K B | | | |
| VR501 | R12-0577-05 | RES. SEMI FIXED 500 B | | | |
| VR502 | R12-1545-05 | RES. SEMI FIXED 1K B | | | |
| W001 | W02-0488-05 | HIGH VOLTAGE BLOCK | | | |

## R/O UNIT

## X77-1510-00

| REF.NO | PARTS NO | NAME & DESCRIPTION | | | |
|---|---|---|---|---|---|
| | J25-5232-12 | PCB (UNMOUNTED) | | | |
| C001 | CE04EW1A470M | CAP. ELECTRO | 47 | 20% | 10V |
| C002 | C91-1245-05 | CAP. CERAMIC | 0.1 | | 12V |
| C003 | C91-0769-05 | CAP. AXIAL | 0.01 | 20% | 16V |
| C004 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C005 | NO USE | | | | |
| C006 | CC45FSL1H331J | CAP. CERAMIC | 330P | 5% | 50V |
| C007 | CC45FCH1H680J | CAP. CERAMIC | 68P | 5% | 50V |
| C008 | CF92FV1H334J | CAP. POLYESTER | 0.33 | 5% | 50V |
| C009 | CF92FV1H334J | CAP. POLYESTER | 0.33 | 5% | 50V |
| C010 | CF92FV1H334J | CAP. POLYESTER | 0.33 | 5% | 50V |
| C011 | CF92FV1H334J | CAP. POLYESTER | 0.33 | 5% | 50V |
| C012 | NO USE | | | | |
| C013 | CC45FCH1H101J | CAP. CERAMIC | 100P | 5% | 50V |
| C016 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C017 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C018 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C019 | CE04EW1C220M | CAP. ELECTRO | 22 | 20% | 16V |
| C020 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C021 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C022 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C023 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C024 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C025 | CE04EW1C220M | CAP. ELECTRO | 22 | 20% | 16V |
| C026 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C027 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C028 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C029 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C030 | CE04EW1C220M | CAP. ELECTRO | 22 | 20% | 16V |
| C031 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C032 | C91-1245-05 | CAP. CERAMIC | 0.1 | | 12V |
| C033 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C034 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C035 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C036 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C037 | CE04EW1C220M | CAP. ELECTRO | 22 | 20% | 16V |
| C038 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C039 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C042 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C043 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C046 | C91-1245-05 | CAP. CERAMIC | 0.1 | | 12V |
| C047 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C048 | CE04EW1C220M | CAP. ELECTRO | 22 | 20% | 16V |
| C049 | CE04EW1C220M | CAP. ELECTRO | 22 | 20% | 16V |
| C050 | C91-0769-05 | CAP. AXIAL | 0.01 | 20% | 16V |
| C051 | C91-0769-05 | CAP. AXIAL | 0.01 | 20% | 16V |
| C052 | C91-0769-05 | CAP. AXIAL | 0.01 | 20% | 16V |
| C053 | C91-0769-05 | CAP. AXIAL | 0.01 | 20% | 16V |
| C054 | CE04EW1A101M | CAP. ELECTRO | 100 | 20% | 10V |
| C055 | NO USE | | | | |
| C056 | C91-1245-05 | CAP. CERAMIC | 0.1 | | 12V |
| C057 | C91-1245-05 | CAP. CERAMIC | 0.1 | | 12V |
| C058 | C91-1245-05 | CAP. CERAMIC | 0.1 | | 12V |
| C059 | C91-1245-05 | CAP. CERAMIC | 0.1 | | 12V |
| C060 | C91-1245-05 | CAP. CERAMIC | 0.1 | | 12V |
| C061 | C91-1245-05 | CAP. CERAMIC | 0.1 | | 12V |
| C062 | C91-1245-05 | CAP. CERAMIC | 0.1 | | 12V |
| C066 | CC45FCH1H470J | CAP. CERAMIC | 47P | 5% | 50V |
| C067 | CC45FCH1H470J | CAP. CERAMIC | 47P | 5% | 50V |
| C068 | CC45FCH1H470J | CAP. CERAMIC | 47P | 5% | 50V |
| C071 | C91-1249-05 | CAP. NETWORK | 0.01X13 | | |
| C072 | C91-1249-05 | CAP. NETWORK | 0.01X13 | | |
| C073 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C074 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C075 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C076 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C077 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C078 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C079 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C080 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C081 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C082 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C083 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C084 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| C085 | CK45FF1H103Z | CAP. CERAMIC | 0.01 | | 50V |

# PARTS LIST

| REF.NO | PARTS NO | NAME & DESCRIPTION | | | |
|---|---|---|---|---|---|
| C901 | CK45F1H103Z | CAP. CERAMIC | 0.01 | | 50V |
| D001 | MA700 | DIODE | | | |
| D002 | MA700 | DIODE | | | |
| L001 | L40-1011-04 | FERRI INDUCTOR | 100UH | | |
| P015 | E40-0473-05 | PIN CONNECTOR | 4P | | |
| P016 | E40-1373-05 | PIN CONNECTOR | 13P | | |
| P033 | E40-1173-05 | PIN CONNECTOR | 11P | | |
| P034 | NO USE | | | | |
| P035 | E40-0973-05 | PIN CONNECTOR | 9P | | |
| P057 | E40-0473-05 | PIN CONNECTOR | 4P | | |
| P065 | E40-0473-05 | PIN CONNECTOR | 4P | | |
| P080 | E40-1173-05 | PIN CONNECTOR | 11P | | |
| Q001 | 2SC2785(F) | TR. SI. NPN | | | |
| Q002 | 2SA1175(F) | TR. SI. PNP | | | |
| R001 | RD14BB2C682J | RES. CARBON | 6.8K | 5% | 1/6W |
| R002 | RD14BB2C512J | RES. CARBON | 5.1K | 5% | 1/6W |
| R005 | RD14BB2C103J | RES. CARBON | 10K | 5% | 1/6W |
| R006 | RD14BB2C102J | RES. CARBON | 1K | 5% | 1/6W |
| R007 | RD14BB2C104J | RES. CARBON | 100K | 5% | 1/6W |
| R008 | RN14BK2C1202F | RES. METAL FILM | 12K | 1% | 1/6W |
| R009 | RD14BB2C123J | RES. CARBON | 12K | 5% | 1/6W |
| R010 | RN14BK2C6200F | RES. METAL FILM | 620 | 1% | 1/6W |
| R011 | RN14BK2C6200F | RES. METAL FILM | 620 | 1% | 1/6W |
| R012 | RN14BK2C9531F | RES. METAL FILM | 9.53K | 1% | 1/6W |
| R013 | RN14BK2C1301F | RES. METAL FILM | 1.3K | 1% | 1/6W |
| R014 | RN14BK2C9101F | RES. METAL FILM | 9.1K | 1% | 1/6W |
| R015 | RD14BB2C102J | RES. CARBON | 1K | 5% | 1/6W |
| R016 | RD14BB2C331J | RES. CARBON | 330 | 5% | 1/6W |
| R017 | RN14BK2C9101F | RES. METAL FILM | 9.1K | 1% | 1/6W |
| R018 | RD14BB2C102J | RES. CARBON | 1K | 5% | 1/6W |
| R019 | RD14BB2C331J | RES. CARBON | 330 | 5% | 1/6W |
| R020 | RN14BK2C3602F | RES. METAL FILM | 36K | 1% | 1/6W |
| R021 | RD14BB2C622J | RES. CARBON | 6.2K | 5% | 1/6W |
| R022 | RN14BK2C7501F | RES. METAL FILM | 7.5K | 1% | 1/6W |
| R023 | RN14BK2C7501F | RES. METAL FILM | 7.5K | 1% | 1/6W |
| R024 | RN14BK2C3602F | RES. METAL FILM | 36K | 1% | 1/6W |
| R025 | RD14BB2C622J | RES. CARBON | 6.2K | 5% | 1/6W |
| R026 | RD14BB2C473J | RES. CARBON | 47K | 5% | 1/6W |
| R027 | RD14BB2C473J | RES. CARBON | 47K | 5% | 1/6W |
| R028 | NO USE | | | | |
| R029 | RN14BK2C1202F | RES. METAL FILM | 12K | 1% | 1/6W |
| R030 | RN14BK2C1101F | RES. METAL FILM | 1.1K | 1% | 1/6W |
| R031 | RD14BB2C562J | RES. CARBON | 5.6K | 5% | 1/6W |
| R032 | RD14BB2C622J | RES. CARBON | 6.2K | 5% | 1/6W |
| R033 | R90-0654-05 | RES. NETWORK | COMPLEX, Y | | |
| R034 | NO USE | | | | |
| R035 | RD14BB2C5R6J | RES. CARBON | 5.6 | 5% | 1/6W |
| R036 | RD14BB2C103J | RES. CARBON | 10K | 5% | 1/6W |
| R037 | RD14BB2C103J | RES. CARBON | 10K | 5% | 1/6W |
| R038 | NO USE | | | | |
| R039 | RD14BB2C153J | RES. CARBON | 15K | 5% | 1/6W |
| R040 | RD14BB2C103J | RES. CARBON | 10K | 5% | 1/6W |
| R043 | R90-0653-05 | RES. NETWORK | 8X10K | 5% | |
| R044 | RD14BB2C472J | RES. CARBON | 4.7K | 5% | 1/6W |
| R045 | NO USE | | | | |
| R046 | RD14BB2C101J | RES. CARBON | 100 | 5% | 1/6W |
| R050 | RD14BB2C301J | RES. CARBON | 300 | 5% | 1/6W |
| R051 | RD14BB2C301J | RES. CARBON | 300 | 5% | 1/6W |
| R052 | RD14BB2C301J | RES. CARBON | 300 | 5% | 1/6W |
| U001 | DAC0808LCN | IC,8-BIT D/A CONVERTER | | | |
| U002 | HD74HC564AP | IC,OCTAL D FLIP-FLOP | | | |
| U003 | HD74HC244AP | IC,OCTAL BUFFER | | | |
| U004 | HD14052BP | IC,DUAL ANALOG MULTIPLEXER | | | |
| U005 | HD14052BP | IC,DUAL ANALOG MULTIPLEXER | | | |
| U006 | HD140518P | IC,ANALOG MULTIPLEXER | | | |
| U007 | M5M27C64*T | IC,CHARACTOR GENERATOR | | | |
| U008 | CTM5020 | IC,GATE ARRAY (R/D CONTROLLER) | | | |
| U009 | AM6012DC | IC,12-BIT D/A CONVERTER | | | |
| U010 | NJM311D | IC,COMPARATOR | | | |
| U011 | NJM4558D | IC,DUAL OP AMP | | | |
| U012 | R90-0655-05 | CR NETWORK | | | |
| U013 | NJM072BD | IC,JFET INPUT OP AMP | | | |
| U014 | HD140518P | IC,ANALOG MULTIPLEXER | | | |

| REF.NO | PARTS NO | NAME & DESCRIPTION |
|---|---|---|
| U015 | NJM4558D | IC,DUAL OP AMP |
| U016 | SN74LS04N | IC,HEX INVERTER |
| U017 | HD74HC138AP | IC,3 TO 8 DECORDER MULTIPLEXER |
| U018 | HD74HC373AP | IC,OCTAL D-LATCHES |
| U019 | SN74LS244N | IC,OCTAL BUFFER |
| U020 | SN74LS244N | IC,OCTAL BUFFER |
| U021 | SN74LS244N | IC,OCTAL BUFFER |
| U022 | SN74LS244N | IC,OCTAL BUFFER |
| U023 | CTM5040 | IC, CPU |
| VR001 | R12-1538-05 | RES. SEMI FIXED 1KB |
| VR002 | R12-2520-05 | RES. SEMI FIXED 5KB |
| X001 | L78-0107-05 | CERAMIC RESONATOR (10MHZ) |

# PARTS LIST

## LINE FILTER UNIT

### X80-1060-03

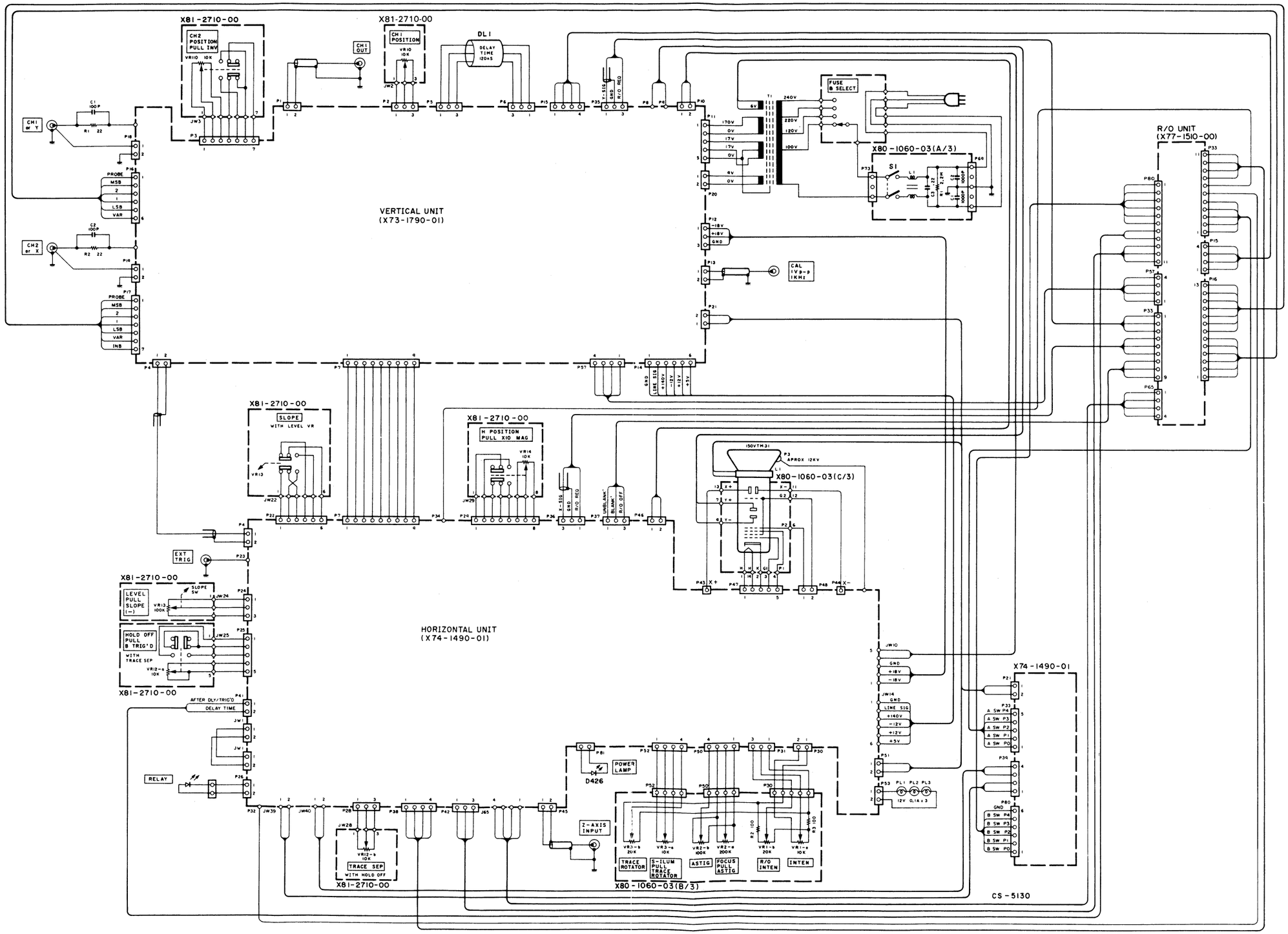
| REF.NO | PARTS NO | NAME & DESCRIPTION | |
|---|---|---|---|
| | E01-0103-05 | CRT SOCKET | |
| | E31-5505-05 | WIRE ASS'Y (+Y,-Y) | |
| | E31-5524-05 | WIRE ASS'Y (+X,-X) | |
| | E31-5528-05 | WIRE ASS'Y (P2,G2) | |
| | E31-5532-15 | WIRE ASS'Y (P1,G1,K) | |
| | J25-5179-33 | PCB (UNMOUNTED) | |
| | R92-0150-05 | JUMPING RES. | ZERO OHM(10MM) |
| C001 | C91-0575-05 | CAP. CERAMIC | 1000P 4KV |
| C002 | C91-0575-05 | CAP. CERAMIC | 1000P 4KV |
| C003 | C91-0551-05 | CAP. POLYESTER | 0.22 10% 630V |
| C004 | CC45CH2H0R5C | CAP. CERAMIC | 0.5P 0.25P 500V |
| L001 | L33-0808-05 | CHOKE COIL | |
| P030 | E40-0574-05 | PIN CONNECTOR | 5P |
| P050 | E40-0474-05 | PIN CONNECTOR | 4P |
| P051 | NO USE | | |
| P052 | E40-0474-05 | PIN CONNECTOR | 4P |
| P069 | E40-0530-05 | PIN CONNECTOR | 5P |
| P073 | E40-0330-05 | PIN CONNECTOR | 3P |
| R001 | RD14BY2H225J | RES. CARBON | 2.2M 5% 1/2W |
| R002 | RD14BB2C101J | RES. CARBON | 100 5% 1/6W |
| R003 | RD14BB2C101J | RES. CARBON | 100 5% 1/6W |
| S001 | S40-2524-05 | PUSH SWITCH (POWER) | |
| VR001 | R10-9508-05 | V.R.(INTENSITY) | 10KB/20KB |
| VR002 | R10-9506-05 | V.R.(FOCUS/ASTIG) | 200KB/100KB |
| VR003 | R10-9507-05 | V.R.(ILLUM/ROTA) | 10KB/20KB |

## VR UNIT

### X81-2710-00

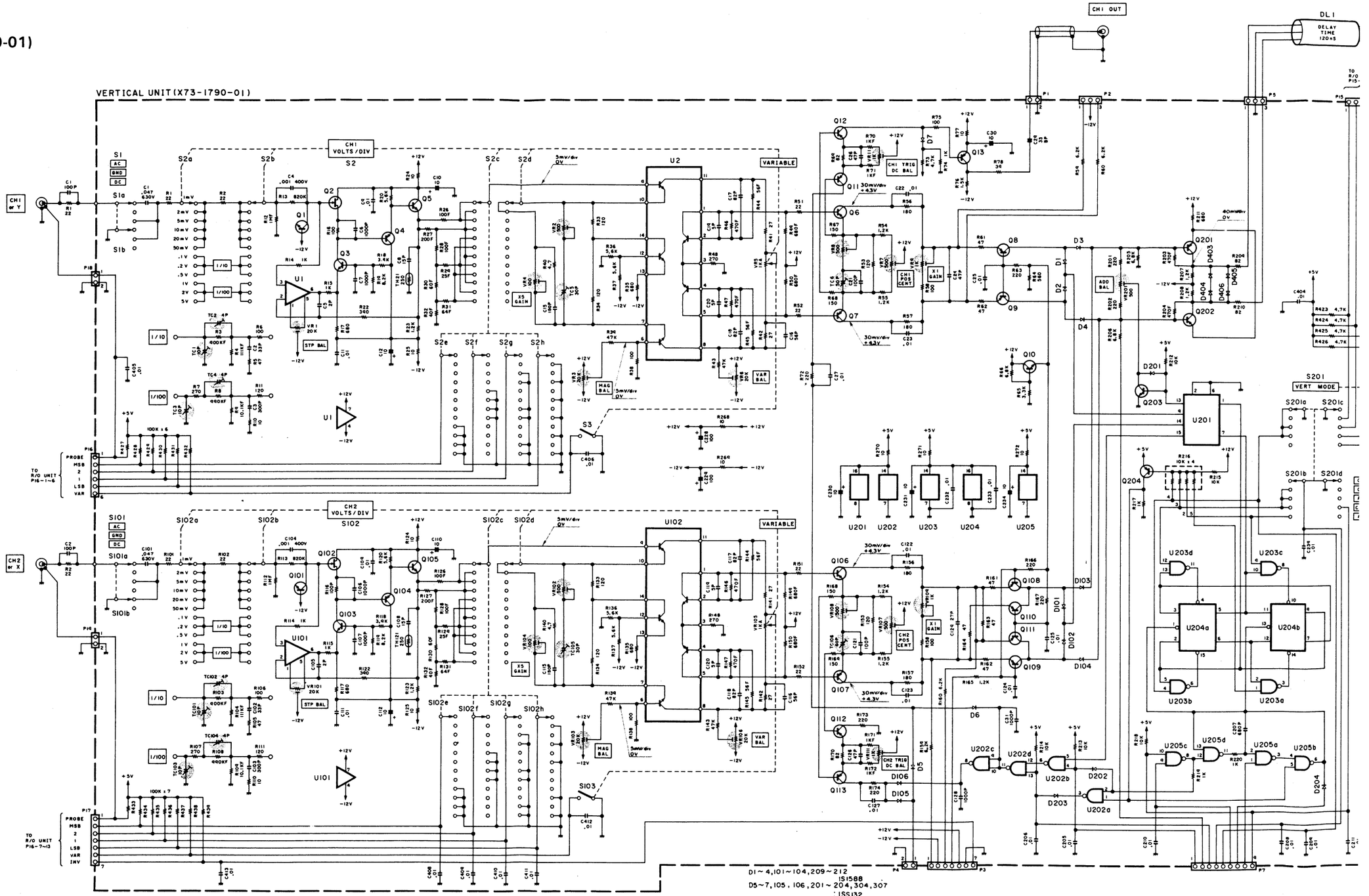
| REF.NO | PARTS NO | NAME & DESCRIPTION | |
|---|---|---|---|
| | J25-5354-03 | PCB (UNMOUNTED) | |
| JW002 | E31-5503-05 | WIRE ASS'Y | |
| JW003 | E31-5507-05 | WIRE ASS'Y | |
| JW022 | E31-5517-05 | WIRE ASS'Y | |
| JW023 | NO USE | | |
| JW024 | E31-5518-05 | WIRE ASS'Y | |
| JW025 | E31-5520-15 | WIRE ASS'Y | |
| JW028 | E31-5522-15 | WIRE ASS'Y | |
| JW029 | E31-5523-05 | WIRE ASS'Y | |
| VR010 | R01-3522-05 | V.R. | 2X10K B |
| VR011 | NO USE | | |
| VR012 | R06-2505-05 | VR WITH SWITCH | 2X10K B |
| VR013 | R01-5513-05 | VR WITH SWITCH | 100K B |
| VR014 | R01-3523-05 | VR WITH SWITCH | 10K B |
| VR110 | R01-3523-05 | VR WITH SWITCH | 10K B |

# SCHEMATIC DIAGRAM



# SCHEMATIC DIAGRAM

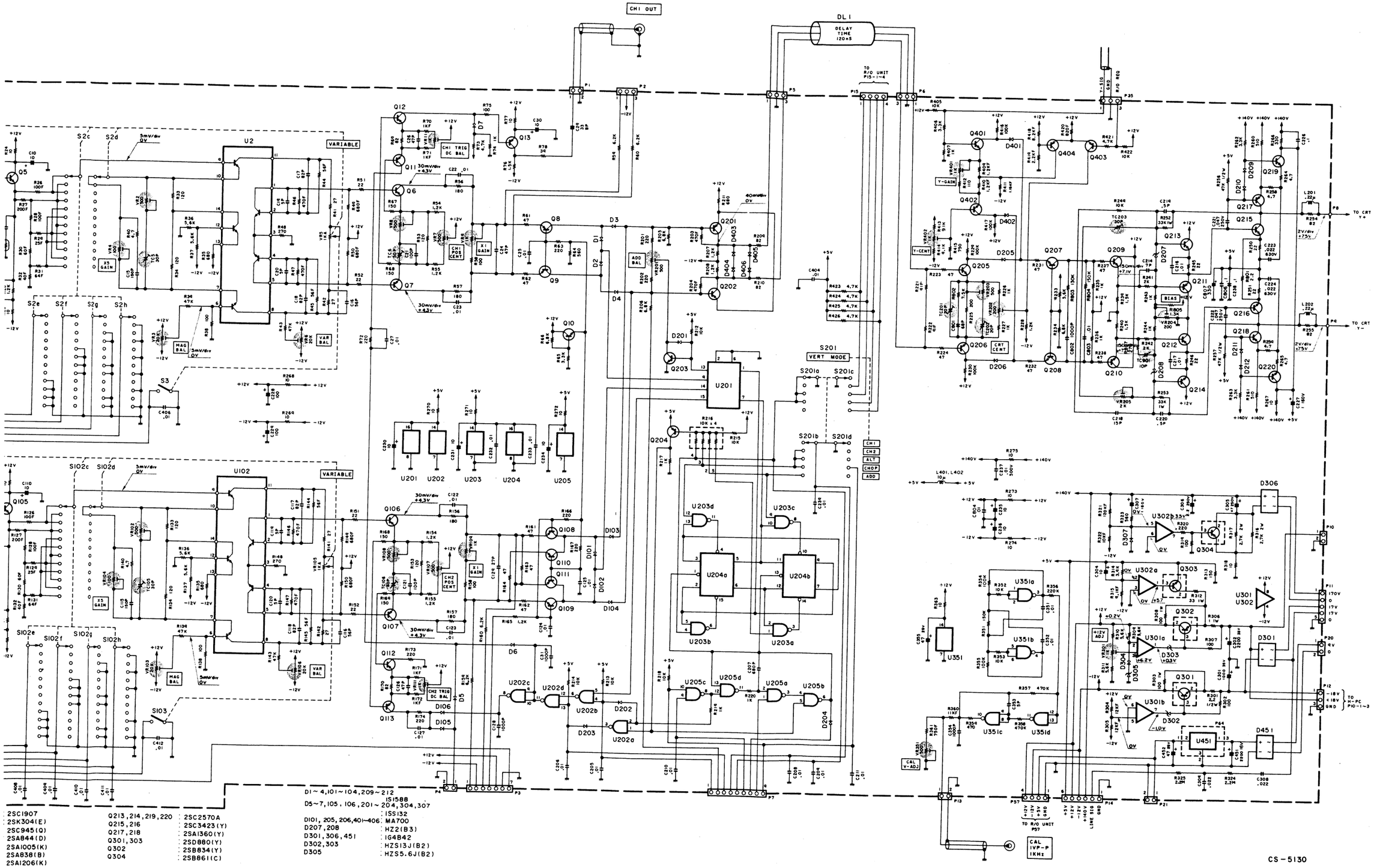
## VERTICAL UNIT (X73-1790-01)




| | | | | | |
|---|---|---|---|---|---|
| U1, 101 | : LF411CN | Q1,13,101,205~210, 401, 402 | : 2SC1907 | Q213, 214, 219, 220 | : 2SC2570A |
| U2, 102 | : CA3086 | Q2, 102 | : 2SK304(E) | Q215, 216 | : 2SC3423(Y) |
| U201 | : SN74LS47N | Q3, 5, 10, 103, 105, 203 | : 2SC945(Q) | Q217, 218 | : 2SA1360(Y) |
| U202, 203, 205 | : SN74LS00N | Q4, 104, 204 | : 2SA844(D) | Q301, 303 | : 2SD880(Y) |
| U204 | : SN74LS112AN | Q6, 7, 11, 12, 106, 107, 112, 113, 403, 404 | : 2SA1005(K) | Q302 | : 2SB834(Y) |
| U301, 302 | : μPC4558C | Q8, 9, 108~111 | : 2SA838(B) | Q304 | : 2SB861(C) |
| U351 | : TC4011BP | Q201, 202, 211, 212 | : 2SA1206(K) | | |
| U451 | : TA78005AP | | | | |

| | |
|---|---|
| D1~4, 101~104, 209~212 | : 1S1588 |
| D5~7, 105, 106, 201~204, 307 | : 1SS132 |
| D101, 205, 206, 401~406 | : MA700 |
| D207, 208 | : HZ2(B3) |
| D301, 306, 451 | : 1G4B42 |
| D302, 303 | : HZS13J(B2) |
| D305 | : HZS5.6J(B2) |

# SCHEMATIC DIAGRAM

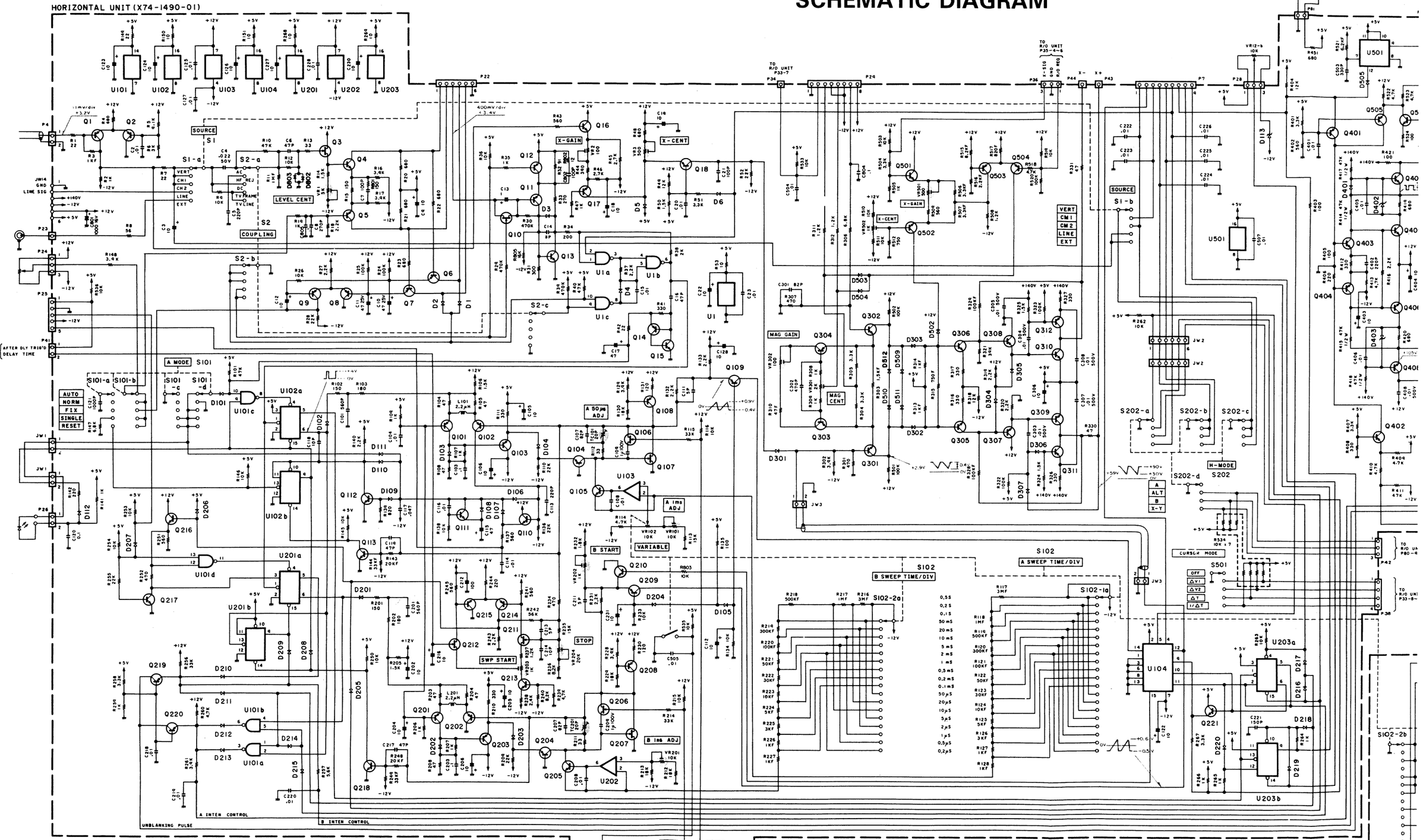



| | | |
|---|---|---|
| 2SC1907 | 0213, 214, 219, 220 | 2SC2570A |
| 2SK304(E) | 0215, 216 | 2SC3423(Y) |
| 2SC945(Q) | 0217, 218 | 2SA1360(Y) |
| 2SA844(D) | 0301, 303 | 2SD880(Y) |
| 2SA1005(K) | 0302 | 2SB834(Y) |
| 2SA838(B) | 0304 | 2SB861(C) |
| 2SA1206(K) | | |

| | |
|---|---|
| D1~4, 101~104, 209~212 | 1S1588 |
| D5~7, 105, 106, 201~204, 304, 307 | 1SS132 |
| D101, 205, 206, 401~406 | MA700 |
| D207, 208 | HZ2(B3) |
| D301, 306, 451 | 1G4B42 |
| D302, 303 | HZS13J(B2) |
| D305 | HZS5.6J(B2) |

CS-5130

# SCHEMATIC DIAGRAM




U1, 101 : SN74LS00N
U102, 201, 203 : SN74LS112AN
U103, 202 : TL081CP
U104 : TC4053BP
U401 : LF1374IN
U501 : TC74HC123AP
U502 : NJM4558D
U701, 702 : DTM-5020

Q11, 104, 204, 308 : 2SA838(B)
Q3 : 2SK304(E)
Q4, 5, 13, 15, 305~307, 403 404, 501, 502 : 2SC1907
Q6~9, 14, 18, 101~103, 108, 109, 201~203 208, 209, 214, 215 : 2SA844(D)

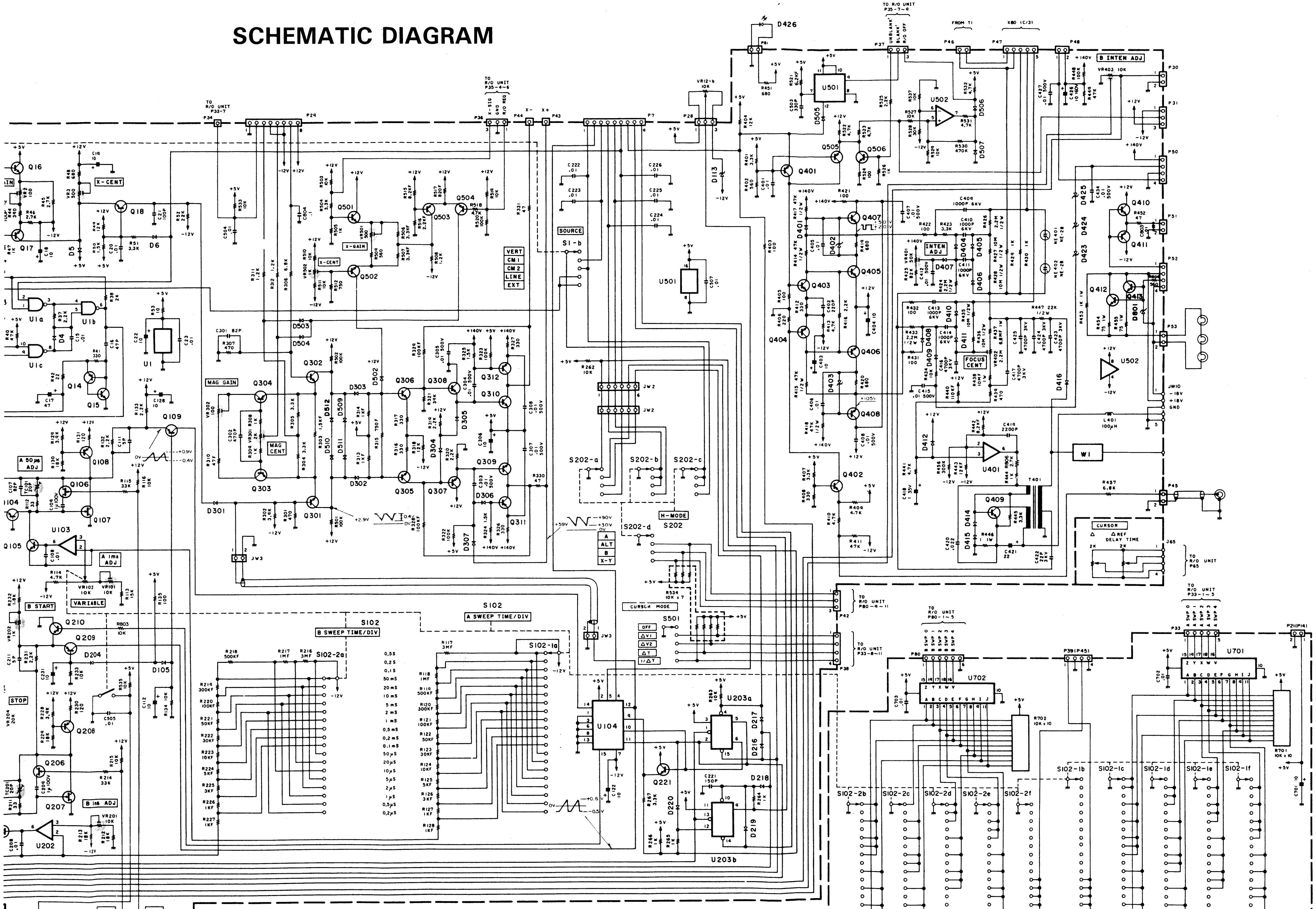
Q10, 106, 206 : 2SK117(BL)
Q12, 210, 303, 304, 411 : 2SA1015(Y)
Q16, 17, 110~113, 213, 216~218, 221, 301, 302 410, 506 : 2SC945(Q)
Q105, 205 : 2SC1843(E)
Q107, 207, 211, 212 : 2SK170(V)

Q1, 2, 219, 220, 401, 402 503~505 : 2SA1005(K)
Q309, 310, 405~408 : 2SD668A(C)
Q311, 312 : 2SB648A(C)
Q409 : 2SD880(Y)
Q412, 413 : 2SC1846(R)

D1, 2, 4, 6, 101, 102, 105~112, 204~210, 212, 213 215~217, 219, 220, 401, 412, 414, 415 503~507, 802, 803 : 1SS132
D3, 304 : 1SS86
D113 : HZS6-8J(B2)
D302, 303, 502, 503, 510, 511 : MA700
D5, 103, 104, 201~203, 211, 214, 218, 301 305, 306, 509, 512 : 1S1588

D307, 404~411 : 1SS83
D402, 403 : HZ2(B3)
D416 : Y10GA
D423~425 : HZ36L(2)
D426 : B30-0957-05
D801 : RD30E(B3)
D802, 803 : 1SS32

# SCHEMATIC DIAGRAM



TO R/O UNIT P33-7
P34
P29
TO R/O UNIT P35-4~6
X-SIG
GND
R/O REQ
P36
P44
X-
X+
P43
P7
VR12-b 10K
P28
D426
P81
TO R/O UNIT P35-7~9
UNBLANK'
BLANK'
R/O OFF
P37
FROM T1
P46
X80 (C/3)
P47
P48
B INTEN ADJ
VR403 10K
P30
P31
P50
P51
P52
P53
JW10
-18V
+18V
GND
L401 100μH
W1
R457 6.8K
P45
CURSOR
Δ
ΔREF
DELAY TIME
J65
TO R/O UNIT P65
X-CENT
X-GAIN
VERT
CM1
CM2
LINE
EXT
SOURCE
S1-b
MAG GAIN
MAG CENT
INTEN ADJ
FOCUS CENT
U501
U502
U401
T401
NE401 NE-28
NE402 NE-28
S202-a
S202-b
S202-c
S202-d
H-MODE
S202
A
ALT
B
X-Y
JW2
JW3
A 50μs ADJ
A 1ms ADJ
VARIABLE
B START
STOP
B 1ms ADJ
U103
U202
U1
U1a
U1b
U1c
S102
A SWEEP TIME/DIV
B SWEEP TIME/DIV
S102-1a
S102-2a
0.5S
0.2S
0.1S
50mS
20mS
10mS
5mS
2mS
1mS
0.5mS
0.2mS
0.1mS
50μS
20μS
10μS
5μS
2μS
1μS
0.5μS
0.2μS
U104
U203a
U203b
CURSOR MODE
S501
OFF
ΔV1
ΔV2
ΔT
1/ΔT
TO R/O UNIT P80-9~11
P42
TO R/O UNIT P33-8~11
P38
TO R/O UNIT P80-1~5
B SWP 0
B SWP 1
B SWP 2
B SWP 3
B SWP 4
P80
U702
R702 10K x 10
P39(P45)
TO R/O UNIT P33-1~5
A SWP 0
A SWP 1
A SWP 2
A SWP 3
A SWP 4
P33
U701
P21(P14)
R701 10K x 10
S102-1b
S102-1c
S102-1d
S102-1e
S102-1f
S102-2b
S102-2c
S102-2d
S102-2e
S102-2f
JW40
JW39
P32
TO R/O UNIT P33-6

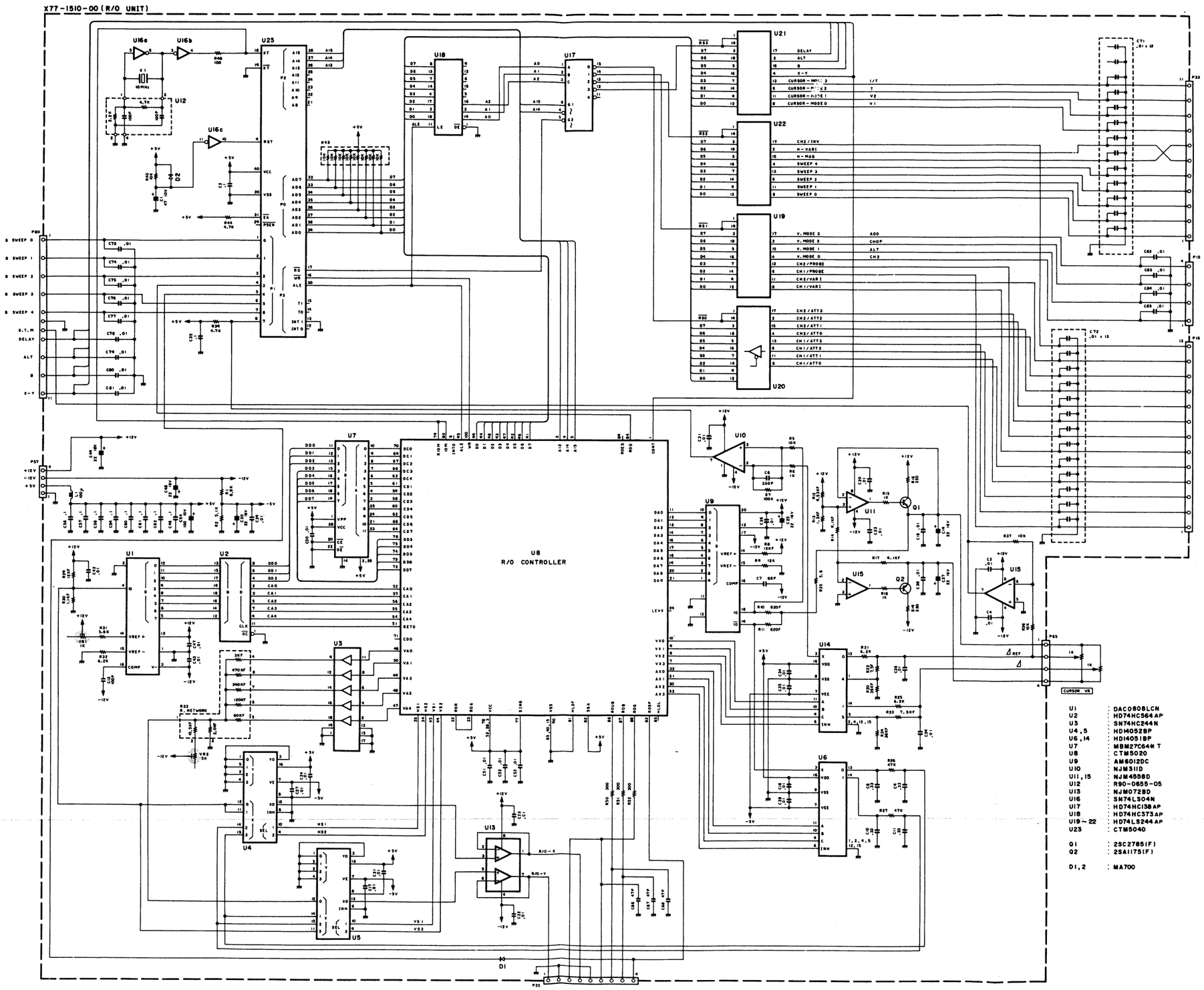

| | |
|---|---|
| Q1, 2, 219, 220, 401, 402 503~505 | : 2SA1005(K) |
| Q309, 310, 405~408 | : 2SD668A(C) |
| Q311, 312 | : 2SB648A(C) |
| Q409 | : 2SD880(Y) |
| Q412, 413 | : 2SC1846(R) |

| | |
|---|---|
| D1, 2, 4, 6, 101, 102, 105~112, 204~210, 212, 213, 215~217, 219, 220, 401, 412, 414, 415 503~507, 802, 803 | : 1SS132 |
| D3, 304 | : 1SS86 |
| D113 | : HZS6.8J(B2) |
| D302, 303, 502, 503, 510, 511 | : MA700 |
| D5, 103, 104, 201~203, 211, 214, 218, 301, 305, 306, 509, 512 | : 1S1588 |
| D307, 404~411 | : 1SS83 |
| D402, 403 | : HZ2(B3) |
| D416 | : Y10GA |
| D423~425 | : HZ36L(2) |
| D426 | : B30-0957-05 |
| D801 | : RD30E(B3) |
| D802, 803 | : 1SS32 |

CS-5130

# SCHEMATIC DIAGRAM

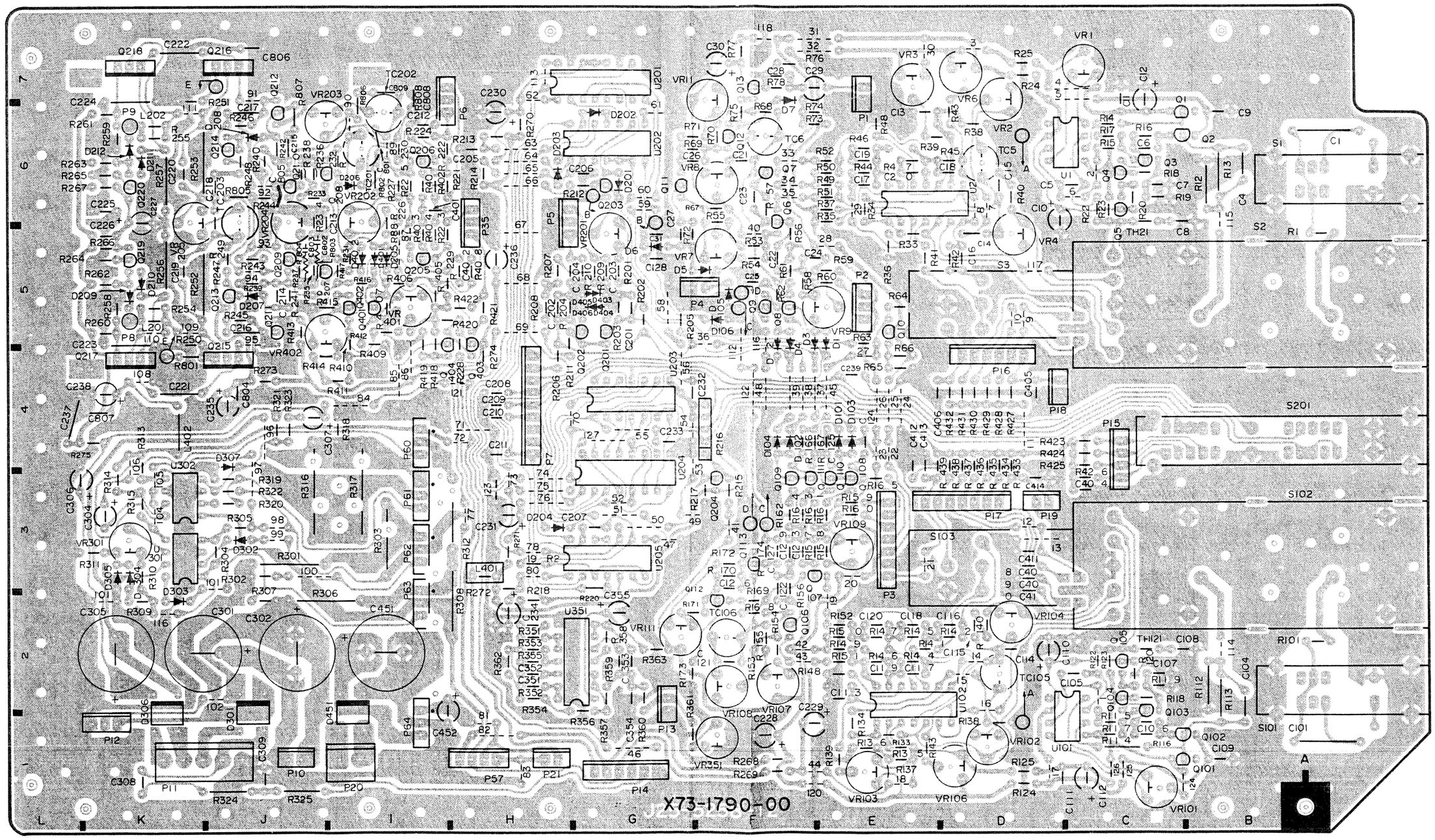
## R/O UNIT (X77-1510-00)



# P.C. BOARD

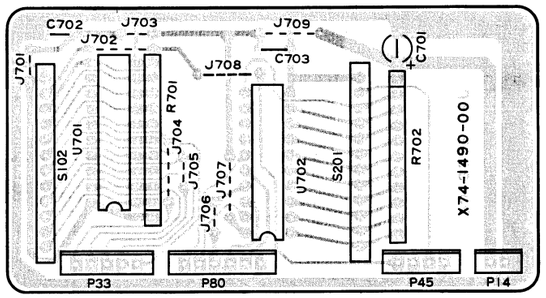
**VERTICAL UNIT (X73-1790-01)**

**Pattern side view**

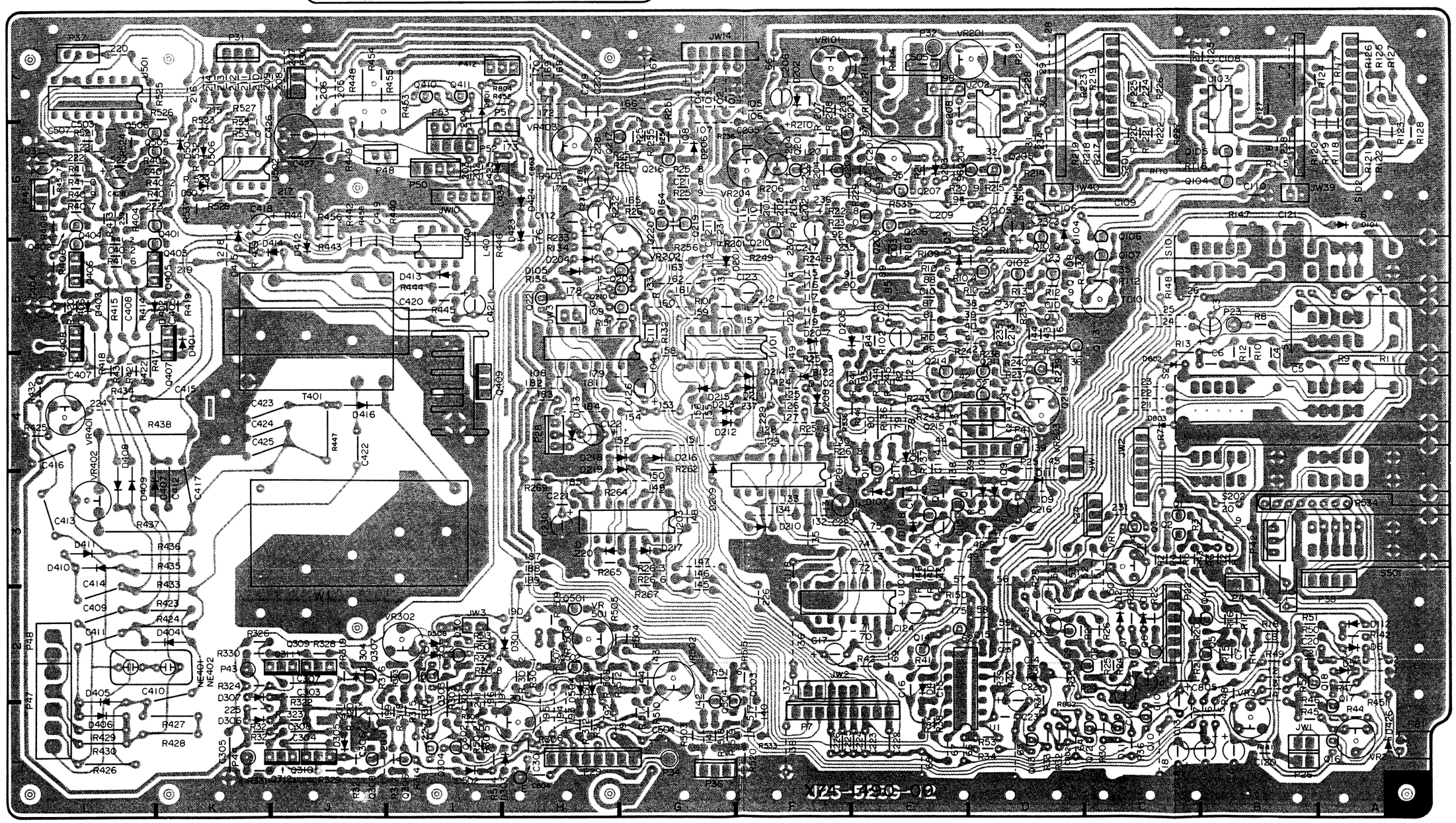


# P.C. BOARD

## HORIZONTAL UNIT (X74-1490-01)

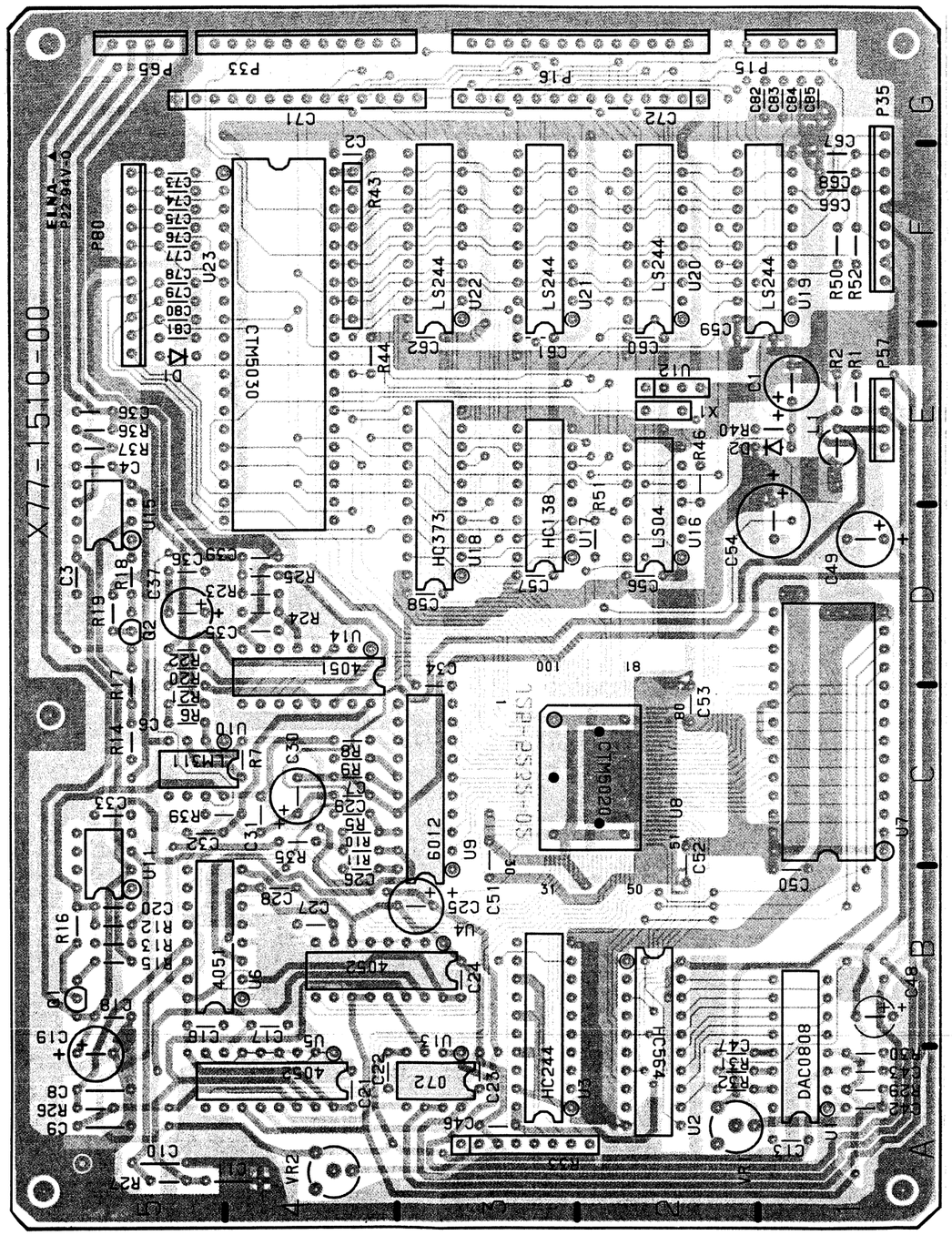



Pattern side view

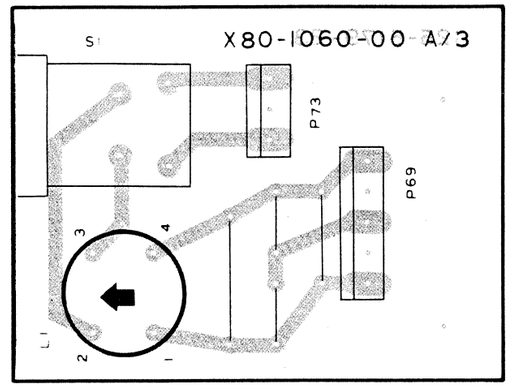


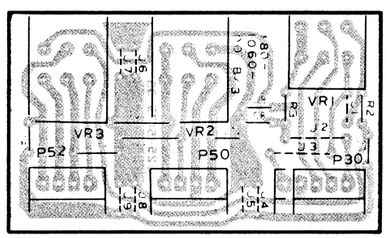
# P.C. BOARD

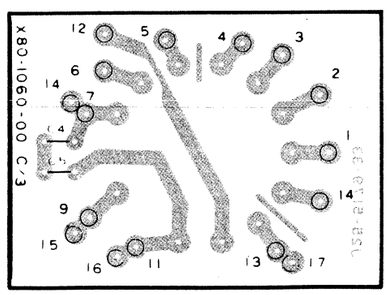
## R/O UNIT (X77-1510-00)




## LINE FILTER UNIT (X80-1060-03)

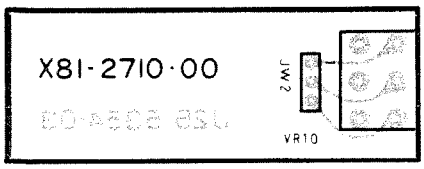


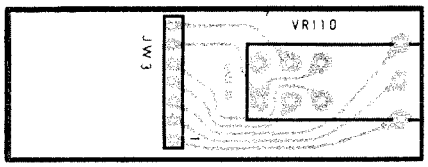



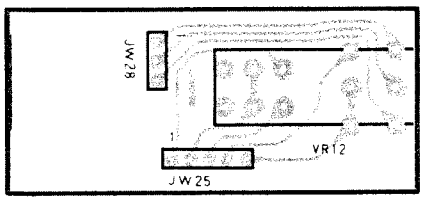



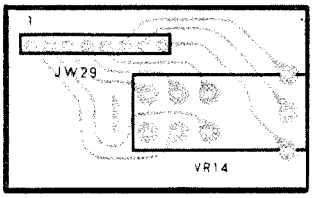
# P.C. BOARD

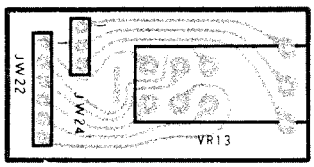
## VR UNIT (X81-2710-00)



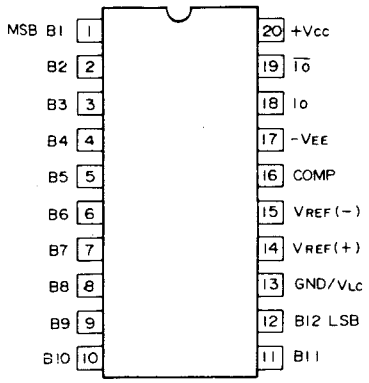



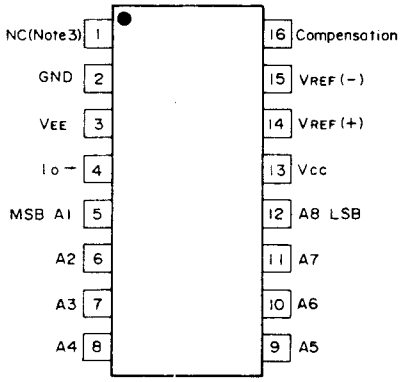



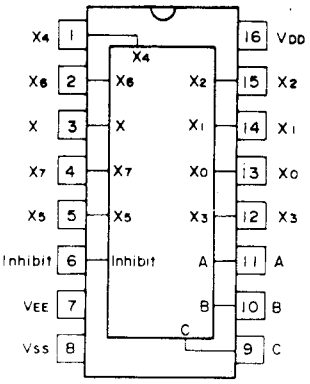
# SEMICONDUCTORS



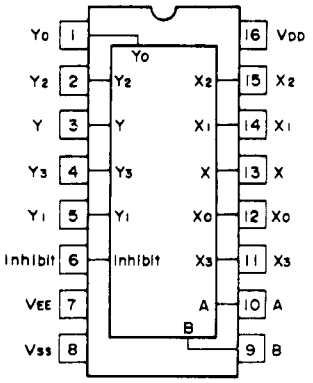

**AM6012DC**




**DAC0808LCN**




**HD14051BP**

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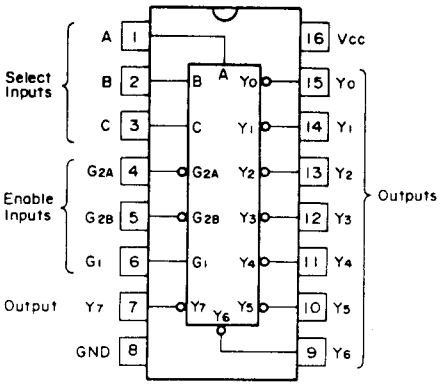
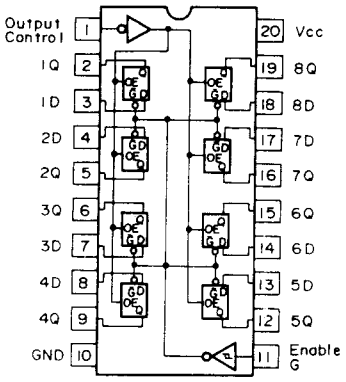



**HD74HC138AP**

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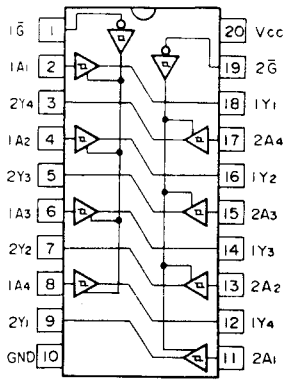
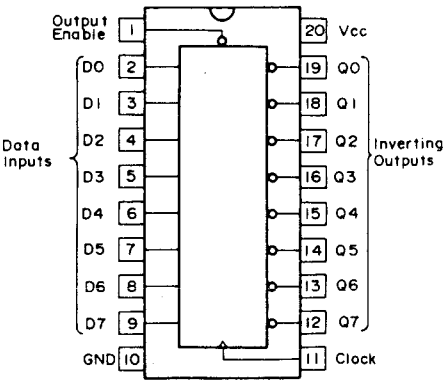
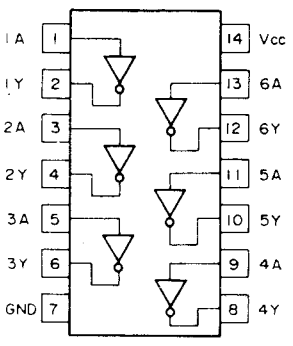



**SN74LS244N**
**HD74HC244AP**

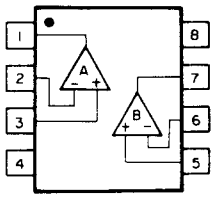



**HD74HC564AP**



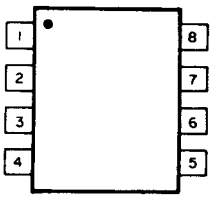

**SN74LS04N**

# SEMICONDUCTORS



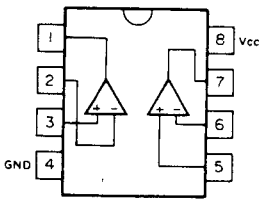

Pin name
1. A OUTPUT
2. A (−) INPUT
3. A (+) INPUT
4. $V^-$
5. B (+) INPUT
6. B (−) INPUT
7. B OUTPUT
8. $V^+$

**NJM072BD**

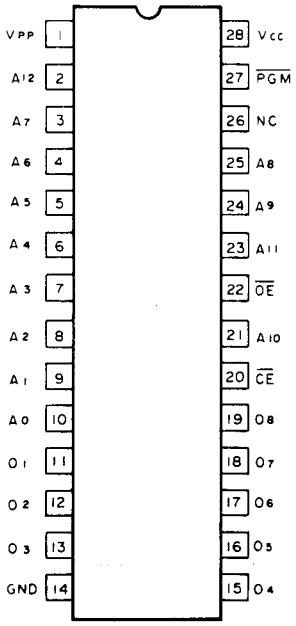



Pin name
1. GROUND
2. + INPUT
3. − INPUT
4. $V^-$
5. BAL
6. BAL/STROBE
7. OUTPUT
8. $V^+$

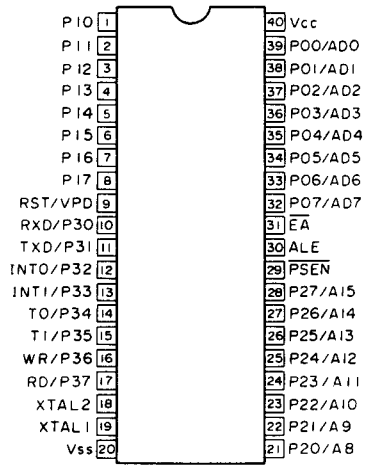
**NJM311D**




**NJM4558D**



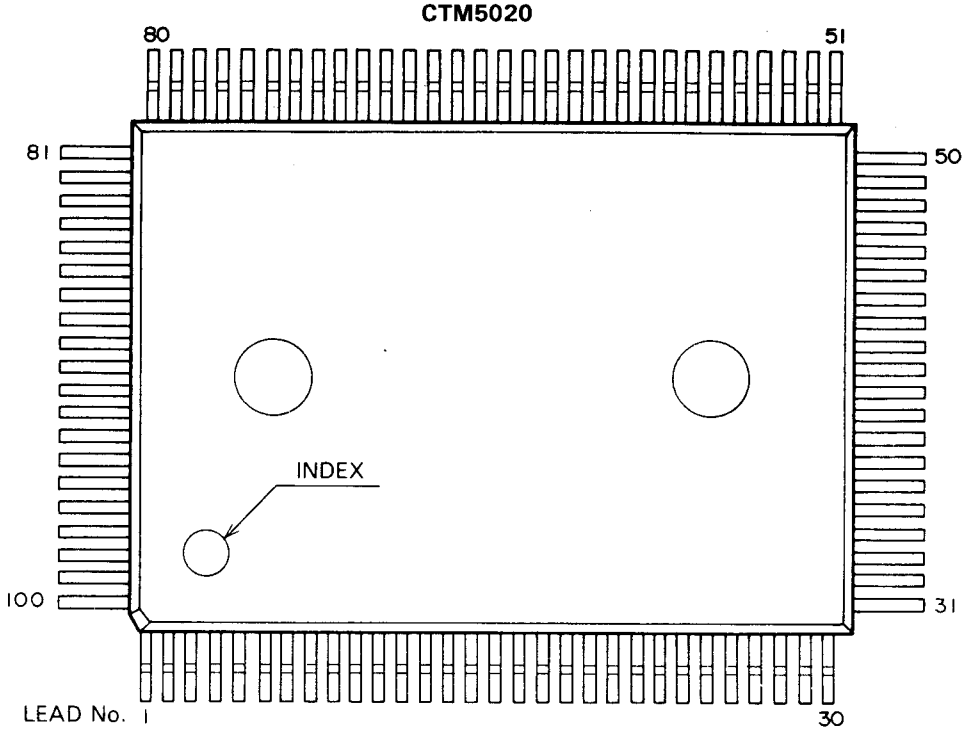

**MBM27C64＊T**




**CTM5040**

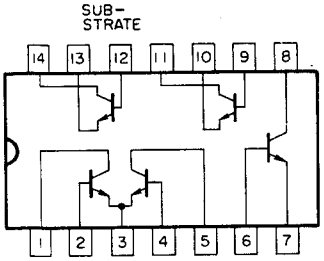
# SEMICONDUCTORS

**CTM5020**




| Pin No. | Pin Name | Pin No. | Pin Name | Pin No. | Pin Name | Pin No. | Pin Name |
|---|---|---|---|---|---|---|---|
| 1 | CONT | 26 | TSD0 | 51 | GETD | 76 | DD3 |
| 2 | A13 | 27 | TSD1 | 52 | CA0 | 77 | SING |
| 3 | VDD | 28 | VDD | 53 | VDD | 78 | VDD |
| 4 | A14 | 29 | TSD2 | 54 | CA4 | 79 | R10M |
| 5 | A15 | 30 | AX2 | 55 | CA3 | 80 | 10M |
| 6 | INT0 | 31 | AX1 | 56 | CA2 | 81 | HLDF |
| 7 | VX3 | 32 | AX0 | 57 | CA1 | 82 | SGA |
| 8 | VX2 | 33 | AX3 | 58 | CD3 | 83 | ROSP |
| 9 | VX1 | 34 | HS2 | 59 | CD2 | 84 | ROD |
| 10 | VX0 | 35 | HS1 | 60 | CD4 | 85 | HLDL |
| 11 | DA0 | 36 | TDIO | 61 | CD1 | 86 | ROUB |
| 12 | DA1 | 37 | TWE | 62 | CD5 | 87 | ROB |
| 13 | DA2 | 38 | TCK1 | 63 | DC4 | 88 | ROQ |
| 14 | DA3 | 39 | TST1 | 64 | CD7 | 89 | ROED |
| 15 | VSS | 40 | VSS | 65 | VSS | 90 | VSS |
| 16 | DA4 | 41 | TST2 | 66 | DC3 | 91 | D7 |
| 17 | DA5 | 42 | TADD | 67 | DC2 | 92 | D5 |
| 18 | DA6 | 43 | TCK2 | 68 | CD6 | 93 | D3 |
| 19 | DA7 | 44 | VS2 | 69 | DC1 | 94 | D1 |
| 20 | DA8 | 45 | VS1 | 70 | DC0 | 95 | ALE |
| 21 | DA9 | 46 | VA0 | 71 | CD0 | 96 | D6 |
| 22 | ROR | 47 | VA4 | 72 | DD7 | 97 | D4 |
| 23 | ROA | 48 | VA3 | 73 | DD6 | 98 | D2 |
| 24 | LEVX | 49 | VA2 | 74 | DD5 | 99 | D0 |
| 25 | TCL | 50 | VA1 | 75 | DD4 | 100 | WR |

# SEMICONDUCTORS

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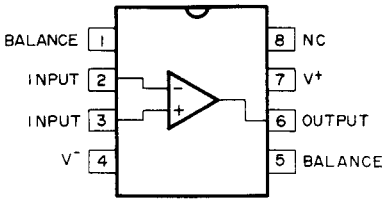


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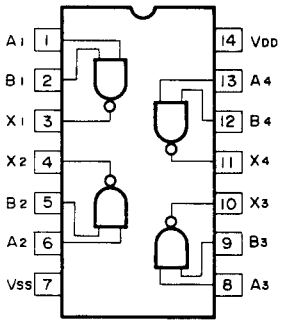
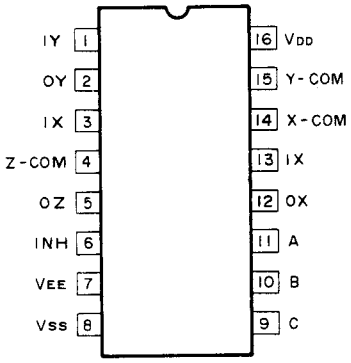
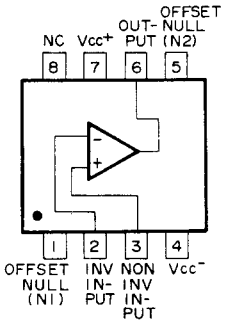


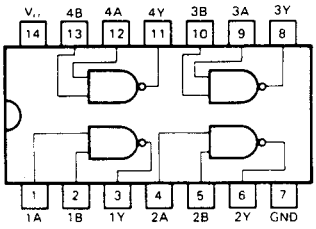

**TC4011BP**



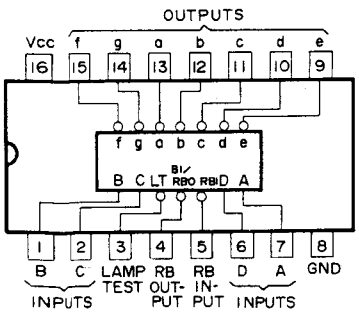

**TC4053BP**



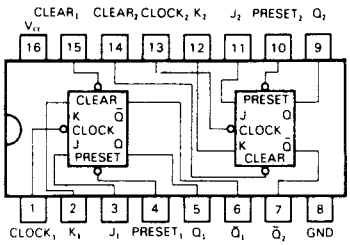

**TL081CP**



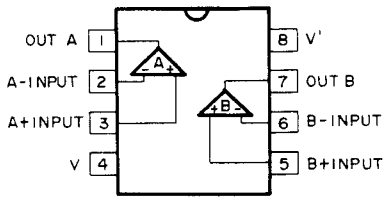

**SN74LS00N**


OUTPUTS
Vcc f g a b c d e
16 15 14 13 12 11 10 9
f g a b c d e
B C LT BI/RBO RBI D A
1 2 3 4 5 6 7 8
B C LAMP TEST RB OUT- PUT RB IN- PUT D A GND
INPUTS INPUTS

**SN74LS47N**

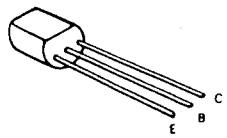

CLEAR1 CLEAR2 CLOCK2 K2 J2 PRESET2 Q2
16 15 14 13 12 11 10 9
CLEAR K Q CLOCK J Q PRESET
PRESET J Q CLOCK K Q CLEAR
1 2 3 4 5 6 7 8
CLOCK1 K1 J1 PRESET1 Q1 Q̄1 Q̄2 GND

**SN74LS112AN**

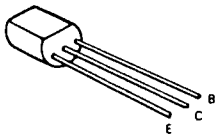



**μPC4558C**

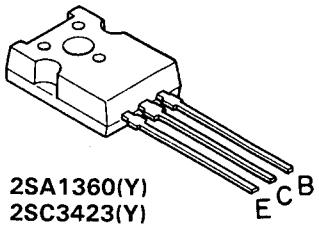
# SEMICONDUCTORS




2SA1206(K)




2SA838(B)
2SA844(D)
2SA1005(K)
2SA1015(Y)
2SC945(Q)
2SC1843(E)
2SC1907

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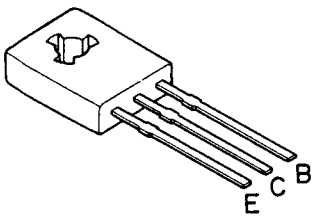
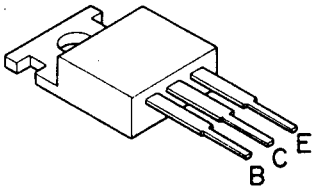
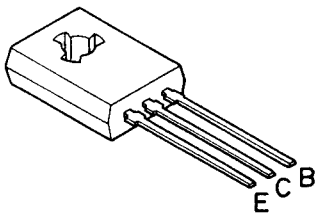
2SC3423(Y)




2SB648A(C)
2SD668A(C)




2SB834(Y)
2SB861(C)
2SD880(Y)

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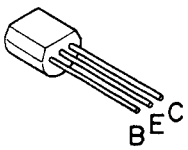
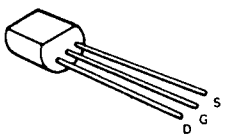



2SC2570A

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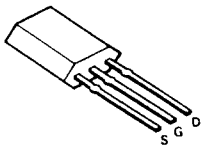
2SK170(V)

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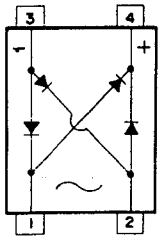
TOP VIEN

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